A DETAILED NUMERICAL EVALUATION OF SHROUD PERFORMANCE FOR FINITE-BLADED DUCTED PROPELLERS

U.S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

distributes this and thousands of similar reports in the interest of science, industry, and the public—for which research and new products mean better health, better living, and a stronger economy.

HOW TO GET OTHER REPORTS

The Office of Technical Services is the Nation's clearinghouse for reports of research supported by the Army, Navy, Air Force, Atomic Energy Commission, and other Government agencies.

Abstracts of new reports available are published twice a month in U. S. GOVERNMENT RESEARCH REPORTS ($15 a year domestic).

Selected Reports of particular interest to small business are described monthly in TECHNICAL REPORTS NEWSLETTER ($1 a year domestic).

Translations of foreign technical material are also available from the Office of Technical Services and other sources. These are listed or abstracted semimonthly in TECHNICAL TRANSLATIONS ($12 a year domestic).

The above periodicals may be ordered from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402, or through a U. S. Department of Commerce Field Office.

Inquiries about the availability of reports and translations on any particular subject may be directed to Office of Technical Services, U. S. Department of Commerce, Washington, D. C., 20230, or to any Commerce field office.

Reports and translations are published by the Office of Technical Services for use by the public. Thus, you may use the know-how or reprint the information therein except that where patent questions appear to be involved the usual preliminary search is advised, and where copyrighted material is used permission should be obtained for its further publication.

These documents are reprinted by OTS from the best available copy.
A DETAILED NUMERICAL EVALUATION
OF SHROUD PERFORMANCE
FOR FINITE-BLADED DUCTED PROPELLERS

by

A. L. Kaskel, D. E. Ordway
G. R. Hough and A. Ritter

TAR-TR 639       December 1963

Submitted to Air Programs, Office of
Naval Research in partial fulfillment of
Contract Nonr-2859(00)

Donald Earl Ordway
Head, Aerophysics Section

Approved:

A. Ritter
Director, Therm Advanced Research
ACKNOWLEDGMENT

The authors wish to acknowledge the cooperation and assistance of Capt. E. Mallick, CDR. A. Van Tuyl and Mr. T. Wilson, Office of Naval Research. They also wish to acknowledge Helene Penn for numerical calculations, Elizabeth Cornelius for manuscript preparation, and Sally Jack of the Cornell University Computing Center for programming the equations used in generating the tables.

Reproduction in whole or in part is permitted for any purpose of the United States Government.
ABSTRACT

Based on the three-dimensional theory developed at Therm Advanced Research, a simple procedure for calculating the detailed aerodynamic loading on the shroud of a finite-bladed ducted propeller in forward flight is presented.

This procedure has been designed for the evaluation of the several thousand configurations exactly represented by the tabulated values of the pertinent parameters, or reasonably approximated by them. In addition, configurations whose parameters fall somewhat in between or outside these values can be evaluated by suitable interpolation or extrapolation. The data were selected through liaison with propeller and aircraft manufacturers to encompass the current state of the art for ducted propeller design.

As a result, it is possible to carry out a number of calculations by hand quite readily which could not be done heretofore, for example, the examination of the effect of the propeller advance ratio.
TABLE OF CONTENTS

INTRODUCTION

CHAPTER ONE - GENERAL DISCUSSION

1.1 Propeller Circulation Distributions 5
1.2 Shroud Thickness and Camber Distributions 7
1.3 Gross Geometry and Flight Parameters 9
1.4 Computation of Tables 10
1.5 Format of Evaluation Procedure 11
1.6 Interpolation/Extrapolation 13

CHAPTER TWO - ILLUSTRATIVE EXAMPLES

2.1 Background 15
2.2 Example for "Reasonably Approximate" Configuration 15
2.3 Example for Interpolation/Extrapolation 22
2.4 Example for Parametric Studies 26

REFERENCES 30

EVALUATION PROCEDURE: SUB-PROCEDURES 1 - 6

TABLE OF PARAMETERS

TABLES 1.1 - 12.2
**NOMENCLATURE**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>parameter for NACA 6-digit mean line, ( x_{a'/c} ); equivalent to ( a - \frac{1}{2} ) of Ref. 13</td>
</tr>
<tr>
<td>( a_\nu )</td>
<td>coefficients of shroud source strength distribution normalized for ( t_m/c = 1 )</td>
</tr>
<tr>
<td>c</td>
<td>shroud chord, see WORKSHEET I</td>
</tr>
<tr>
<td>( c_{f2D}(x/c) )</td>
<td>linearized two-dimensional contribution of shroud thickness to shroud surface pressure coefficient</td>
</tr>
<tr>
<td>( c_{fl_1} )</td>
<td>two-dimensional design lift coefficient of NACA 6-digit mean line; equivalent to ( c_{f_i} ) of Ref. 13</td>
</tr>
<tr>
<td>( c_m )</td>
<td>shroud sectional pitching moment coefficient about one-quarter chord, ( m/\frac{1}{2}\rho U^2 c^2 )</td>
</tr>
<tr>
<td>( c_p(x/c) )</td>
<td>shroud surface pressure coefficient, ( (p-p_\infty)/\frac{1}{2}\rho U^2 )</td>
</tr>
<tr>
<td>( c_r )</td>
<td>shroud sectional radial force coefficient, ( r/\frac{1}{2}\rho U^2 c )</td>
</tr>
<tr>
<td>( C_f )</td>
<td>shroud thrust coefficient, ( \ell/\frac{1}{2}\rho U^2 \pi R_p^2 )</td>
</tr>
<tr>
<td>( c_{\Gamma,(x/c)} )</td>
<td>direct propeller contribution to shroud surface pressure coefficient</td>
</tr>
<tr>
<td>( C_{\Gamma't} )</td>
<td>propeller-shroud thickness contribution to shroud thrust coefficient</td>
</tr>
<tr>
<td>( C_{\Gamma't\nu} )</td>
<td>( \nu^{th} ) term of ( C_{\Gamma't} )</td>
</tr>
</tbody>
</table>
$c_{\nu}^{3D}$ three-dimensional Glauert coefficients of effective shroud camber

$C_T$ propeller thrust coefficient, $T/\frac{1}{2} \rho U^2 \pi R_p^2$

e ratio of propeller radius to inner shroud surface radius at propeller plane, $R_p/R_i$

$F(\varphi, k)$ incomplete elliptic integral of the first kind with argument $\varphi$ and modulus $k$

$i$ angle of incidence of shroud chord line relative to shroud axis, positive leading edge inward, see WORKSHEET I

$J$ propeller advance ratio, $U/\Omega R_p$

$k, \ell$ dummy element indices, $k$ designating row and $\ell$ designating column

$m$ parameter for NACA 4-digit mean line, $y_m/c$; equivalent to $m$ of Ref. 13

$m$ shroud sectional pitching moment about quarter chord point or pitching moment per unit circumferential length, positive leading edge inward

$N$ number of propeller blades

$O_{k, \ell}$ elements for curvature correction of two-dimensional Glauert coefficients of effective shroud camber

$p$ parameter for NACA 4-digit mean line, $x_m/c$; equivalent to $(p-\frac{1}{5})$ of Ref. 13
\( p(x/c) \) static pressure on shroud surface

\( p_{\infty} \) free-stream static pressure

\( Q_{k, \ell} \) elements for evaluation of camber induced by shroud thickness

\( Q_{n-\frac{1}{2}}(\omega) \) Legendre function of the second kind and half integer order with argument \( \omega \), see Ref. 14

\( z \) shroud sectional radial force or radial force per unit circumferential length, positive outward

\( R \) shroud reference radius, taken as radius of camber line at propeller plane, see WORKSHEET I

\( R_i \) radius of shroud inner surface at propeller plane, see WORKSHEET I

\( R_p \) propeller radius, see WORKSHEET I

\( S_{k, \ell} \) elements for shroud curvature contribution to shroud surface pressure arising from effective shroud camber

\( t \) total axial force on shroud, positive upstream

\( t_m \) maximum shroud thickness, see WORKSHEET I

\( t_p \) shroud thickness at propeller plane, see WORKSHEET I

\( T \) propeller thrust
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_{k, \ell}$</td>
<td>elements for shroud curvature contribution to shroud surface pressure arising from shroud thickness</td>
</tr>
<tr>
<td>$U$</td>
<td>free stream velocity</td>
</tr>
<tr>
<td>$\frac{v(x/c)}{V}$</td>
<td>ratio of total local velocity on shroud induced by the two-dimensional thickness distribution to the free stream velocity, see Ref. 13</td>
</tr>
<tr>
<td>$x, r$</td>
<td>cylindrical coordinates with origin at center of shroud, see WORKSHEET I</td>
</tr>
<tr>
<td>$x_a$</td>
<td>axial position of aft end of constant portion of two-dimensional loading obtained from NACA 6-digit mean lines; measured relative to midchord, see WORKSHEET I</td>
</tr>
<tr>
<td>$x_{cp}$</td>
<td>axial position of shroud sectional center of pressure; measured relative to midchord, see WORKSHEET I</td>
</tr>
<tr>
<td>$x_m$</td>
<td>axial position of maximum ordinate of NACA 4-digit mean lines measured along shroud chord line; here taken relative to midchord in linearized sense, see WORKSHEET I</td>
</tr>
<tr>
<td>$x_p$</td>
<td>axial position of propeller plane; measured relative to midchord, see WORKSHEET I</td>
</tr>
<tr>
<td>$y_m$</td>
<td>maximum ordinate of NACA 4-digit mean line measured from shroud chord line; here taken in linearized sense as radial deviation, see WORKSHEET I</td>
</tr>
<tr>
<td>$\beta$</td>
<td>Glaauert type variable for propeller circulation, $\cos^{-1}\left(\frac{r}{R_p}\right)$</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>$\Gamma(x/R_p)$, $\Gamma(\beta)$</td>
<td>propeller circulation distribution</td>
</tr>
<tr>
<td>$\Delta c_p^{2D}(x/c)$</td>
<td>two-dimensional net pressure coefficient for NACA 6-digit mean lines; equivalent to $P_R$ of Ref. 13</td>
</tr>
<tr>
<td>$\epsilon(x/c)$</td>
<td>two-dimensional geometric camber</td>
</tr>
<tr>
<td>$\epsilon_{\Gamma,v}(x/c)$</td>
<td>two-dimensional propeller induced camber</td>
</tr>
<tr>
<td>$\epsilon_{\Gamma,v}$</td>
<td>two-dimensional Glauert coefficients of propeller induced camber</td>
</tr>
<tr>
<td>$\epsilon_{\nu}$</td>
<td>two-dimensional Glauert coefficients of geometric camber</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>ratio of shroud chord to shroud reference diameter, $c/2R$</td>
</tr>
<tr>
<td>$\mu$</td>
<td>ratio of propeller radius to shroud reference radius, $R_p/R$</td>
</tr>
<tr>
<td>$\nu$</td>
<td>dummy index</td>
</tr>
<tr>
<td>$\rho$</td>
<td>fluid density</td>
</tr>
<tr>
<td>$\chi$</td>
<td>ratio of propeller plane position to shroud chord, $x_p/c$</td>
</tr>
<tr>
<td>$\Omega$</td>
<td>angular velocity of propeller</td>
</tr>
</tbody>
</table>
Introduction

Under the sponsorship of the Office of Naval Research, personnel of Therm Advanced Research have been engaged for the past four and one-half years in the general study of ducted propellers with finite blade number. As part of a long range ONR V/STOL program, the basic objective has been to provide a definitive analysis for different flight regimes.

A theory of the forward flight regime for zero angle of attack has been completed\textsuperscript{1-6}, including the effects of shroud camber, thickness and chord to diameter ratio, as well as the propeller loading, blade number, advance ratio, tip clearance and axial position. These results furnish not only general formulas for both the steady and harmonic shroud loads but also considerable physical insight into the overall problem. However, the analytic solution is not amenable to detailed aerodynamic evaluation because it requires the use of electronic computers to perform certain numerical calculations. Since the engineering value of any such solution is measured by the ease with which data can be extracted, these machine calculations were
carried out at TAR for representative ducted propeller configurations. This report is the result: namely, the development of a simple procedure whereby the steady shroud net loading, surface pressures, thrust, sectional radial force, sectional pitching moment and sectional center of pressure can be calculated by hand.

To review briefly, the theory was derived as follows. The fluid is taken as inviscid and incompressible. Viewed in propeller-fixed coordinates, the duct is replaced by suitable distributions of sources and vortices on a cylindrical reference surface whose axis is coincident with the duct axis. The propeller blades are represented by individual, radial vortex lines of varying circulation and accompanying trailing helical vortex sheets. If the form of the propeller circulation is assumed, the formulation of the governing equations then follows the procedure of thin lifting-surface theory. Within the limitations of this theory, we find that the problem for the steady load is equivalent to an axisymmetric ring wing with the same thickness distribution as the given duct but an "effective" camber composed of the original geometric camber plus the radial wash of the shroud sources and propeller trailing vortices.

The source strength is simply proportional to the rate of change of airfoil thickness and its effects are quite readily adaptable to a hand calculation procedure. To determine the strength of the shroud
vortices on the other hand, it is necessary to calculate the two-
dimensional Glauert coefficients of the effective camber and correct
them in turn for shroud curvature. The curvature correction is no
difficulty but the calculation of the Glauert coefficients is, i.e., a
technique for numerical Fourier analysis is required. Unfortunately
the nature of the propeller contribution to the effective camber in par-
ticular is such that the available hand methods, e.g., Ref. 8, are in-
adequate. As a result, the Fourier analysis had to be carried out by
machine and this, together with the propeller camber itself, constituted
the major computational effort.

With regard to the propeller circulation, distributions for a so-
called optimum without a hub are used. NACA thickness and camber
distributions have been chosen for the shroud airfoil section. Data are
tabulated for several values of the pertinent parameters which encom-
pass the current state of the art for ducted propeller design. Utilizing
all possible combinations of these tables enables the exact evaluation of
several thousand ducted propeller configurations. Reasonable "non-
exact" cases can be evaluated by proper interpolation or extrapolation.

Chapter One elaborates on the choice and other details of the
propeller circulation, the shroud airfoil sections, and the range of the
gross parameters of geometry and flight condition. The method of
computation and related information for the tables, the format of the
evaluation and a suggested interpolation or extrapolation technique are also presented. Chapter Two contains illustrative numerical examples giving all the work as it should appear on the worksheets. The report concludes with the actual evaluation procedure and the tabulated data.

It is hoped that this design procedure will pave the way for detailed evaluation and parametric study of ducted propeller configurations which were impracticable previously. It is also hoped that this report will be recognized as a source of information of a more universal nature, e.g., the Glauert coefficients for the NACA 4-, 5- and 6-digit mean lines.
CHAPTER ONE
GENERAL DISCUSSION

1.1 Propeller Circulation Distributions

The form of the distribution of the propeller circulation $\Gamma$ determines the propeller induced camber $\epsilon$ and the direct contribution of the propeller $c_{\Gamma}$ to the shroud surface pressure coefficient $c_p$. There are several choices. As opposed to our original thought, we have picked the classical Betz optimum with a tip correction derived by T. Goodman to account for the proximity of the duct. Since certain three-dimensional effects of both the propeller and shroud are omitted, such an optimum will not be a true one. Further difficulties may arise from viscous effects if the tip lies within the shroud boundary layer. Despite these complications, however, it should yield fairly accurate results for the propeller-shroud interaction phenomena and moreover, it is relatively easy to compute, cf. Ref. 11.

The specific circulation distributions used in the evaluation procedure are given in TABLES 1.1 - 1.3, each normalized so as to produce a unit propeller thrust coefficient $C_T = 1$ neglecting inflow. The other parametric inputs consist of the number of blades $N$, the ratio of the propeller radius to the radius of the inner shroud surface $e \equiv R_p/R_1$, and the propeller advance ratio or ratio of the forward speed to the tip
speed $J \equiv U/\Omega R_p$. Because of the square-root behavior of these
distributions at the tip, a Glauert-type angular variable $\beta$ was intro-
duced to insure sufficient accuracy. Though increments of only $5^\circ$ are
shown, increments down to $0.125^\circ$ were computed in some cases. The
corresponding radial stations $r/R_p$ are given for convenience.

These circulation distributions are not used directly in the proce-
dure but are presented for general information and completeness. For
example, if evaluation for a different bladewise thrust gradient

$$\frac{dC_{T/N}}{dr/R_p} = \frac{2}{\pi J} \frac{\Gamma(r/R_p)}{R_p U} \frac{r}{R_p}$$

(1)

is desired, it can be approximated by superposition though this capa-

bility has not been incorporated explicitly in the procedure.

When a hub is present, the shape of the distribution is altered
such that it cannot be fitted by the given distributions. However, these
changes are relatively small and essentially confined to a region near
the hub. To simulate a hub in a crude fashion, configurations have
been run in which the tabulated circulation distributions have been
simply truncated at the hub. The results indicate that hubs with
diameters up to about 25% of the propeller diameter have a negligible
effect on the shroud performance and that the performance can be
evaluated using the given circulation distributions. The direct effect of the radial velocity induced by the hub depends upon the shape and extent of the hub and can be estimated from slender body theory.

The results for the case of a uniform circulation have been compared with the tabulated distributions. Since they are independent of $e$ and for a fixed value of $C_T$, also $N$ and $J$, the number of calculations are greatly reduced but some discrepancies are introduced. In general, the two-dimensional Glauert coefficients of the propeller induced camber $e_{\Gamma',\nu}$ fall within the tabulated values for a given set of overall geometric parameters to be described later. The discrepancy in the values averages about 5%. For extremum values of $J$, though, the discrepancy can be as large as 20%. The same magnitude of discrepancy is also introduced in the direct propeller contribution to the shroud surface pressure coefficient $c_{\Gamma'}$, and the propeller-shroud thickness contribution to the shroud thrust coefficient $C_{\Gamma',t}$.

1.2 Shroud Thickness and Camber Distributions

In the evaluation procedure typical shroud thickness and camber distributions are represented by the NACA 4-, 5- and 6-digit series of airfoil sections and mean lines. These distributions have been selected because they are well known and data for them is readily available. Other shapes may be obtained by superposition. Data is also included for the idealized case of zero thickness.
The scaling rules appropriate to each NACA airfoil and mean line have been incorporated in the design procedure. However, for 6-digit airfoil sections which can be scaled only within a given family and for 5-digit mean lines which can not be scaled, the evaluation procedure contains only data for those distributions which are listed in the TABLE OF PARAMETERS.

In general, standard NACA symbols are preserved, but those parameters which depend upon chordwise position are referred to the midchord of the shroud instead of the leading edge in order to be consistent with the coordinate system we have adopted, see WORKSHEET I. The 4- and 5-digit airfoil sections are characterized by the ratio of the maximum thickness to the chord \( t_m/c \). The 6-digit airfoil sections are characterized by their family, i.e., the first two digits of the NACA designation; within a given family, the airfoil is characterized by the ratio \( t_m/c \). The 4-digit mean lines are characterized by the ratio of the maximum mean line ordinate to the chord \( m \equiv y_m/c \) and the ratio of the axial position of this ordinate to the chord \( p \equiv x_m/c \). The 5-digit mean line is characterized by its NACA designation. The 6-digit mean line is characterized by the ratio of the axial position of the aft end of the constant portion of the two-dimensional loading to the chord \( a \equiv x_a/c \) and the two-dimensional design lift coefficient \( c_{\ell_i} \).
1.3 Gross Geometry and Flight Parameters

As we have seen, the basic component parameters for the propeller circulation are \( C_T, N, e \) and \( J \); for the shroud thickness distribution, \( t_m/c \) or the NACA family designation; and for the shroud geometric camber distribution, \( m \) and \( p \), or the NACA designation, or \( \alpha \) and \( c_f \). In addition, there are three other parameters for the ducted propeller as a whole: the relative location of the propeller plane with respect to the midchord \( x \equiv x_p/c \), the shroud chord to diameter ratio \( \lambda \equiv c/2R \), where \( R \) is the reference radius of the shroud camber line at the propeller plane, and the ratio of the propeller radius to the reference radius \( \mu \equiv R_p/R \). The thickness distribution parameter \( t_m/c \) is not an independent parameter of the problem. Once the values of \( \lambda \), \( e \), and \( \mu \) are specified, the value of \( t_m/c \) for a given NACA airfoil section is uniquely determined. In order to eliminate the possibility of using the incorrect value of \( t_m/c \), the evaluation procedure contains a method whereby the proper value is always computed.

The range of the parameters chosen is shown in the TABLE OF PARAMETERS. Certain of the parameters take on only specific values while others are arbitrary. Data has been generated and is presented for all possible combinations of the indicated values. In view of the large number of parameters, considerable selectivity had to be
exercised. To make the values chosen as representative of ducted propeller practice as possible, two things were done. First we made an extensive compilation of the parameters for all the known configurations which have been tested and on this basis made our preliminary choices. This was followed up by discussion and contact with various propeller and aircraft manufacturers. Their thoughts then, together with consideration of what was a reasonable computational effort, guided us to the final values adopted.

1.4 Computation of Tables

Most of the tables were generated specifically for the present report. No derivations are given but the equations used are shown on the cover sheet which precedes each set. If necessary, these equations may be obtained from the cited references generally in the exact form as shown. In the cases where the form is different, an obvious change in variable and/or integration by parts is required. The rest of the tables were taken from previous reports and are simply reproduced.

Also included on the coversheet is the accuracy of the numbers and any pertinent information regarding the use of the tables. For example, on the cover sheet for TABLES 6.1 - 6.18, there are instructions for the use of the tables when \( x = 0.25 \). These instructions utilize certain symmetries in order to economize on the number of tables which have to be presented. It is thus important that the coversheets be read carefully.
before using the tables.

All new machine computations were carried out on the IBM 7090 or CDC 1604. The incomplete elliptic integral of the first kind $F(\varphi, k)$ was computed by a modified SHARE program and the Legendre function of the second kind and half integer order $Q_{n-\frac{1}{2}}(\omega)$ by our own program\textsuperscript{14}. A Generalized Simpson's Rule was written for all integrals. In this program the interval of integration is successively halved until three consecutive answers are obtained which agree to within the prescribed accuracy.

We have checked and proofed the tables thoroughly. All equations have been double-checked for analytical correctness by rederivation, as well as all computer programs by both spot and sample hand calculations using numerical procedures different from the machine. Proof-reading has been done three times to insure that all data was transcribed accurately from the machine printout.

1.5 Format of Evaluation Procedure

The evaluation procedure consists of six (6) sub-procedures and two worksheets on which all calculations are done directly. The sub-procedures are:

1. DETERMINATION OF PARAMETERS

2. COMPUTATION OF THREE-DIMENSIONAL GLAUERT COEFFICIENTS OF EFFECTIVE CAMBER
3. COMPUTATION OF SHROUD SECTIONAL RADIAL FORCE AND MOMENT COEFFICIENTS AND CENTER OF PRESSURE

4. COMPUTATION OF SHROUD THRUST COEFFICIENT

5. COMPUTATION OF NET SHROUD PRESSURE COEFFICIENTS

6. COMPUTATION OF OUTER AND INNER SHROUD SURFACE PRESSURE COEFFICIENTS

Two sample prints of each worksheet accompany the report for trial calculations. Like the tables, the previous references should be consulted for the basic background on the manipulations involved.

The order in which the computations are done is essentially arbitrary, except for SUB-PROCEDURES 1 and 2. These must always be done first and in sequential order regardless of what other results are required. Once SUB-PROCEDURE 1 is completed, any of the remaining may be done by non-engineering personnel.

The sub-procedural instructions indicate what tables should be taken and where to write them on the worksheets. The worksheets are made up of an appropriate layout of the ducted propeller geometry and numbered columns. The worksheets, themselves, also contain a set of instructions which indicate the mathematical operations to be performed after completion of the respective sub-procedural steps. These instructions are written primarily in equation form using the column
headings as the terms of the equations. The indicated operations are to be performed on each element in the column. The resulting directions of action of all forces and moments are shown pictorially.

1.6 Interpolation/Extrapolation

The evaluation procedure has been designed for the evaluation of the configurations exactly represented by the particular values chosen for the parameters or reasonably approximated by these values. Nevertheless, "non-exact" cases, i.e., configurations whose parameters fall somewhat in between or outside those tabulated, can be evaluated by suitable interpolation or extrapolation.

Experience has shown us that the best way is first to evaluate several "exact" configurations using values of the tabulated parameters which bound or adjoin those for the "non-exact" case and, then, to interpolate or extrapolate in the final results. The actual value of the arbitrary parameters are used in the evaluations with the exception of \( t_m/c \). The value of \( t_m/c \) used must be consistent with the values of \( \lambda \), \( e \) and \( \mu \) as explained previously on p. 9. Although this technique requires the evaluation of several configurations, it has one great advantage. Namely, all other "non-exact" cases anywhere in the same region of interpolation or extrapolation are readily found.

Direct interpolation or extrapolation of the tabulated data before evaluation will also work, provided only one of the actual parameters
does not correspond to the tabulated parameters. If more than one parameter is different, then one or more multiple interpolations or extrapolations are generally required. This becomes not only very complicated and time consuming, but results in the loss of accuracy through both computational and arithmetical errors.
CHAPTER TWO
ILLUSTRATIVE EXAMPLES

2.1 Background

Three typical examples are presented to illustrate some of the ways in which the evaluation procedure can be applied, the numerical operations involved in each sub-procedure and the use of the tables. For each example a set of completed worksheets are given showing the proper number of decimal places consistent with the accuracy of the tables. We have kept three places for the most part. Where readily practicable, though, we have retained four places to minimize the accumulation of round-off errors.

2.2 Example for "Reasonably Approximate" Configurations

The first example is the complete evaluation of a configuration which is reasonably approximated by the tabulated data. The completed worksheets are reproduced in Figs. 1 and 2 and can be worked out straightforwardly by following the sub-procedures. The dimensions given correspond, of course, to the actual configuration, but the dimensions for the "reasonably approximate" configuration are found by modifications consistent with the chosen tabulated parameters. For the same propeller radius, the dimensions of this configuration are

\[ R_p = 3.5000 \text{ ft}, \quad c = 3.8889 \text{ ft}, \quad R_i = 3.5354 \text{ ft}, \]
### SUB-PROCEDURE 2
COMPUTATION OF THREE-DIMENSIONAL GLAUVENT COEFFICIENTS OF EFFECTIVE CAMBER

#### Variables:
- \( x \)
- \( y \)
- \( z \)
- \( u \)
- \( v \)
- \( w \)
- \( t \)
- \( s \)
- \( a \)
- \( b \)
- \( c \)
- \( d \)
- \( e \)
- \( f \)
- \( g \)
- \( h \)
- \( i \)
- \( j \)
- \( k \)
- \( l \)
- \( m \)
- \( n \)
- \( o \)
- \( p \)
- \( q \)
- \( r \)
- \( s \)
- \( t \)
- \( u \)
- \( v \)
- \( w \)
- \( x \)
- \( y \)
- \( z \)

#### Equations:
- \( \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0 \)
- \( \frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2} = 0 \)
- \( \frac{\partial^2 w}{\partial x^2} + \frac{\partial^2 w}{\partial y^2} + \frac{\partial^2 w}{\partial z^2} = 0 \)

#### Tables:

#### Diagram:

### SUB-PROCEDURE 3
COMPUTATION OF SHILOH THRUST COEFFICIENT

#### Variables:
- \( \theta \)
- \( \phi \)
- \( \psi \)
- \( \alpha \)
- \( \beta \)
- \( \gamma \)
- \( \delta \)
- \( \epsilon \)
- \( \zeta \)
- \( \eta \)
- \( \theta \)
- \( \vartheta \)
- \( \kappa \)
- \( \lambda \)
- \( \mu \)
- \( \nu \)
- \( \xi \)
- \( \psi \)
- \( \chi \)
- \( \psi \)
- \( \omega \)

#### Equations:
- \( \tan(\theta) = \frac{\sin(\phi)}{\cos(\psi)} \)
- \( \tan(\phi) = \frac{\sin(\theta)}{\cos(\psi)} \)
- \( \tan(\psi) = \frac{\sin(\theta)}{\cos(\phi)} \)

#### Code:

```
// Code for computing thrust coefficients
```

### SUB-PROCEDURE 4
COMPUTATION OF SHILOH THRUST COEFFICIENT

#### Variables:
- \( \theta \)
- \( \phi \)
- \( \psi \)
- \( \alpha \)
- \( \beta \)
- \( \gamma \)
- \( \delta \)
- \( \epsilon \)
- \( \zeta \)
- \( \eta \)
- \( \theta \)
- \( \vartheta \)
- \( \kappa \)
- \( \lambda \)
- \( \mu \)
- \( \nu \)
- \( \xi \)
- \( \psi \)
- \( \chi \)
- \( \psi \)
- \( \omega \)

#### Equations:
- \( \tan(\theta) = \frac{\sin(\phi)}{\cos(\psi)} \)
- \( \tan(\phi) = \frac{\sin(\theta)}{\cos(\psi)} \)
- \( \tan(\psi) = \frac{\sin(\theta)}{\cos(\phi)} \)

#### Code:

```
// Code for computing thrust coefficients
```

### TABLE 1
ONABLY APPROXIMATE CONSTRUCTION

#### Variables:
- \( x \)
- \( y \)
- \( z \)
- \( u \)
- \( v \)
- \( w \)
- \( t \)
- \( s \)
- \( a \)
- \( b \)
- \( c \)
- \( d \)
- \( e \)
- \( f \)
- \( g \)
- \( h \)
- \( i \)
- \( j \)
- \( k \)
- \( l \)
- \( m \)
- \( n \)
- \( o \)
- \( p \)
- \( q \)
- \( r \)
- \( s \)
- \( t \)
- \( u \)
- \( v \)
- \( w \)
- \( x \)
- \( y \)
- \( z \)

#### Equations:
- \( x = y + z \)
- \( u = v + w \)
- \( t = s + a \)

#### Code:

```
// Code for approximating construction
```

---

**Note:** The tables and equations are extracted from the image and represent the natural text of the document. The mathematical expressions, variables, and codes are accurately transcribed.
### SUB-PROCEDURE 5
COMPUTATION OF NET SHROUD PRESSURE COEFFICIENTS

<table>
<thead>
<tr>
<th>102</th>
<th>108</th>
<th>114</th>
<th>120</th>
<th>126</th>
<th>132</th>
<th>138</th>
<th>144</th>
<th>150</th>
<th>156</th>
<th>162</th>
<th>168</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of course 81 on WORKSHEET 1 as the first element of course 102, 108, 114, 120, 126, 132, 138, 144, 150, 156, 162, and 168 respectively.

### SUB-PROCEDURE 6
COMPUTATION OF OUTER AND INNER SHROUD SURFACE PRESSURE COEFFICIENTS

<table>
<thead>
<tr>
<th>102</th>
<th>108</th>
<th>114</th>
<th>120</th>
<th>126</th>
<th>132</th>
<th>138</th>
<th>144</th>
<th>150</th>
<th>156</th>
<th>162</th>
<th>168</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the first seven elements of course 81 on WORKSHEET 1 as the first element of course 102, 108, 114, 120, 126, 132, and 138 respectively.

<table>
<thead>
<tr>
<th>103</th>
<th>109</th>
<th>115</th>
<th>121</th>
<th>127</th>
<th>133</th>
<th>139</th>
<th>145</th>
<th>151</th>
<th>157</th>
<th>163</th>
<th>169</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of course 102 as the first element of course 103, 109, 115, 121, 127, 133, 139, 145, 151, 157, 163, and 169 respectively.

<table>
<thead>
<tr>
<th>110</th>
<th>116</th>
<th>122</th>
<th>128</th>
<th>134</th>
<th>140</th>
<th>146</th>
<th>152</th>
<th>158</th>
<th>164</th>
<th>170</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of course 128 as the first element of course 110, 116, 122, 128, 134, 140, 146, 152, 158, 164, and 170 respectively.

### FIGURE 2
COMPLETED WORKSHEET II FOR "REASONABLY APPROX..."
NABLY APPROXIMATE" CONFIGURATION
\[ x_p = -0.9722 \text{ ft} \], and \[ t_p = 0.7070 \text{ ft} \]. The "new" value of \[ t_p \] used in the calculations was 0.6614 ft; see Step 4 of SUB-PROCEDURE 1. It should also be noted that the value of \( \Omega \) changes to 140 rad/sec. The respective configurations are drawn to scale in Fig. 3 and do not appear appreciably different.

An "exact" evaluation of the actual configuration has also been run by means of the general computer programs. The worksheets, completed as if tables were available for these values of the parameters, are shown in Figs. 4 and 5. For this case the tabulated data for \( \Gamma(\beta)/R_p U \) was generated by using the equations given on the cover-sheet for TABLES 1.1 - 1.3 with \( F(\varphi,k)/F(\pi/2,k) \) being obtained by four-point Lagrangian interpolation of data not published in this report but which is available in the general computer program. Similarly, the elements \( O_k, l \) were obtained by three-point Lagrangian interpolation of data in Ref. 2, and the elements \( Q_k, l \) and \( T_k, l \) by three-point Lagrangian interpolation of the appropriate tables contained in this report. Within the range of the parameters \( N, e, J \) and \( \lambda \), the interpolated results are as accurate as those which can be obtained by actual calculations using the equations on the appropriate cover-sheet.

The relative magnitudes of the shroud sectional force and moment coefficients and center of pressure, the shroud thrust coefficient and
FIGURE 3

GEOMETRY COMPARISON OF ACTUAL AND "REASONABLY APPROXIMATE" CONFIGURATIONS

(See Figs. 1, 2, 4 and 5 for comparison of various coefficients.)
SUB-PROCEDURE 1
DETERMINATION OF PARAMETERS

COMPUTATION OF

SUB-PROCEDURE 3
COMPUTATION OF SECTIONAL RADIAL FORCE AND MOMENT COEFFICIENTS AND CENTER OF PRESSURE

FIGURE 4
COMPLETED WORKSHEET I FOR "EXACT" EVALUATION OF
**ALURATION OF ACTUAL CONFIGURATION**
the shroud outer and inner surface pressure coefficients for the two cases may be found from Figs. 1 and 4 and Figs. 2 and 5, respectively. The overall numerical agreement indicates roughly the level of confidence which can be attached to the use of the evaluation procedure for "reasonably approximate" configurations. In general, it appears that we obtain a satisfactory engineering estimate.

2.3 Example for Interpolation/Extrapolation

The second example is the computation of the outer and inner shroud surface distributions for a "non-exact" configuration. Arbitrarily, the parameters of the actual configuration correspond to the tabulated values of the parameters with the exception of the propeller plane position. Its value of -0.125 is such that it lies midway between two tabulated values.

For this case, three evaluations were performed with $x = -0.25, 0.0$ and $0.25$, the corresponding values of $t$ being 0.3979 ft, 0.4537 ft, and 0.2969 ft. The results for the actual configuration were then obtained by three-point Lagrangian interpolation of this data. Figs. 6 and 7 are the completed worksheets for $x = 0.25$.

An "exact" evaluation has also been run using the general computer programs. The two results are presented in Fig. 8 along with
FIGURE 6

COMPLETED WORKSHEET I FOR INTERPOLATION/EX'1 RAPID
### SUB-PROCEDURE 2

**COMPUTATION OF THREE-DIMENSIONAL GLAUV COEFFICIENTS OF EFFECTIVE CAMBER**

<table>
<thead>
<tr>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1054</td>
<td>0.0690</td>
<td>1.799</td>
<td>0.1455</td>
</tr>
<tr>
<td>0.0335</td>
<td>-0.0699</td>
<td>-0.2509</td>
<td>0.0325</td>
</tr>
<tr>
<td>-0.4488</td>
<td>0.0690</td>
<td>0.0615</td>
<td>0.0409</td>
</tr>
<tr>
<td>0.0765</td>
<td>-0.2225</td>
<td>0.0414</td>
<td>0.0116</td>
</tr>
<tr>
<td>0</td>
<td>0.0800</td>
<td>0</td>
<td>0.0105</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.0690</td>
<td>0.0283</td>
</tr>
<tr>
<td>0.0200</td>
<td>0</td>
<td>0.0211</td>
<td>0.0031</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.0211</td>
<td>0.0031</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.0211</td>
<td>0.0031</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.0211</td>
<td>0.0031</td>
</tr>
</tbody>
</table>

**Notes:**
1. Write the elements of column 3 as the first element of columns 7, 8, 13, 15, 17, and 19 respectively.
2. $20 + 4 = 24$
3. Write the first seven elements of column 29 as the last elements of columns 43, 45, 47, 49, 53, and 55 respectively.
4. $24 + 4 = 28$
5. $28 + 4 = 32$
6. **ON/EXTRAPOLATION EXAMPLE,** $x = 0.25$
**TABLE 1**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 3**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 4**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 5**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 6**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**TABLE 7**

<table>
<thead>
<tr>
<th>C</th>
<th>C2</th>
<th>C4</th>
<th>C6</th>
<th>C8</th>
<th>C10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**FIGURE 7**

**COMPLETED WORKSHEET II FOR INTERPOLATION/EXTRAPOLATION**
FIGURE 8
A COMPARISON OF INTERPOLATED AND "EXACT" SHROUD SURFACE PRESSURE DISTRIBUTIONS
### SHROUD OUTER SURFACE PRESSURE DISTRIBUTION

**Interpolated "Exact"**

<table>
<thead>
<tr>
<th>x/c</th>
<th>x=-0.25</th>
<th>x=0.0</th>
<th>x=0.25</th>
<th>x=-0.125</th>
<th>x=-0.125</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.50</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
</tr>
<tr>
<td>-0.40</td>
<td>0.231</td>
<td>0.242</td>
<td>0.183</td>
<td>0.245</td>
<td>0.241</td>
</tr>
<tr>
<td>-0.30</td>
<td>0.093</td>
<td>0.113</td>
<td>0.042</td>
<td>0.114</td>
<td>0.107</td>
</tr>
<tr>
<td>-0.20</td>
<td>0.049</td>
<td>0.065</td>
<td>-0.011</td>
<td>0.069</td>
<td>0.063</td>
</tr>
<tr>
<td>-0.10</td>
<td>-0.008</td>
<td>0.016</td>
<td>-0.063</td>
<td>0.017</td>
<td>0.017</td>
</tr>
<tr>
<td>0</td>
<td>-0.056</td>
<td>-0.036</td>
<td>-0.121</td>
<td>-0.033</td>
<td>-0.039</td>
</tr>
<tr>
<td>0.10</td>
<td>-0.088</td>
<td>-0.068</td>
<td>-0.152</td>
<td>-0.065</td>
<td>-0.068</td>
</tr>
<tr>
<td>0.20</td>
<td>-0.083</td>
<td>-0.067</td>
<td>-0.136</td>
<td>-0.064</td>
<td>-0.071</td>
</tr>
<tr>
<td>0.30</td>
<td>-0.011</td>
<td>-0.008</td>
<td>-0.026</td>
<td>-0.007</td>
<td>-0.008</td>
</tr>
<tr>
<td>0.40</td>
<td>0.053</td>
<td>0.048</td>
<td>0.076</td>
<td>0.046</td>
<td>0.046</td>
</tr>
<tr>
<td>0.50</td>
<td>0.154</td>
<td>0.130</td>
<td>0.220</td>
<td>0.128</td>
<td>0.132</td>
</tr>
</tbody>
</table>

### SHROUD INNER SURFACE PRESSURE DISTRIBUTION

**Interpolated "Exact"**

<table>
<thead>
<tr>
<th>x/c</th>
<th>x=-0.25</th>
<th>x=0.0</th>
<th>x=0.25</th>
<th>x=-0.125</th>
<th>x=-0.125</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.50</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
<td>∞</td>
</tr>
<tr>
<td>-0.40</td>
<td>-1.051</td>
<td>-1.024</td>
<td>-1.131</td>
<td>-1.021</td>
<td>1.029</td>
</tr>
<tr>
<td>-0.30</td>
<td>-0.955</td>
<td>-0.955</td>
<td>-1.084</td>
<td>-0.939</td>
<td>-0.955</td>
</tr>
<tr>
<td>-0.20</td>
<td>-0.837</td>
<td>-0.931</td>
<td>-1.075</td>
<td>-0.878</td>
<td>-0.913</td>
</tr>
<tr>
<td>-0.10</td>
<td>-0.760</td>
<td>-0.876</td>
<td>-1.039</td>
<td>-0.812</td>
<td>-0.781</td>
</tr>
<tr>
<td>0</td>
<td>-0.704</td>
<td>-0.746</td>
<td>-0.983</td>
<td>-0.701</td>
<td>-0.673</td>
</tr>
<tr>
<td>0.10</td>
<td>-0.652</td>
<td>-0.624</td>
<td>-0.932</td>
<td>-0.596</td>
<td>-0.618</td>
</tr>
<tr>
<td>0.20</td>
<td>-0.515</td>
<td>-0.485</td>
<td>-0.736</td>
<td>-0.465</td>
<td>-0.485</td>
</tr>
<tr>
<td>0.30</td>
<td>-0.339</td>
<td>-0.322</td>
<td>-0.414</td>
<td>-0.317</td>
<td>-0.326</td>
</tr>
<tr>
<td>0.40</td>
<td>-0.119</td>
<td>-0.122</td>
<td>-0.114</td>
<td>-0.122</td>
<td>-0.120</td>
</tr>
<tr>
<td>0.50</td>
<td>0.154</td>
<td>0.130</td>
<td>0.220</td>
<td>0.128</td>
<td>0.132</td>
</tr>
</tbody>
</table>
the tabulation of the three sets of interpolation data. The extent of the interpolation involved is reflected by comparison with the results included for the case with no propeller present. Again, we find that the overall agreement is very good and clearly seems to justify such interpolation or extrapolation.

2.4 Example for Parametric Studies

The third and final example illustrates the use of the evaluation procedure as a vehicle for parametric studies. We have chosen to find the variation of the shroud thrust coefficient with the shroud incidence holding the remaining parameters fixed.

For this calculation, it is not necessary to consider a specific configuration nor SUB-PROCEDURES 3, 5 and 6 . The worksheets appropriately completed for \( i = -0.20 \), 0.0 , and 0.20 rad are shown altogether in Fig. 9 . Only those columns having more than one value in any element have to be changed in performing the calculation for each value of \( i \). The uppermost value corresponds to \( i = -0.20 \) rad ; the lower-left value corresponds to \( i = 0.0 \) rad ; and the lower-right value corresponds to \( i = 0.20 \) rad .

The results of the evaluation are plotted in Fig. 10 and show that the variation is exactly linear over the range examined. This result is not unexpected. That is, the shroud thrust coefficient is determined
### SUB-PROCEDURE 1
**DETERMINATION OF PARAMETERS**

For 5-Digit Mean Line: Conical UP
For 6-Digit Mean Line: Conical Down

<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
<th>( \theta )</th>
<th>( \theta )</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Chord} )</td>
<td>1.0472</td>
<td>0</td>
<td>0.0004</td>
<td>0</td>
</tr>
</tbody>
</table>

### SUB-PROCEDURE 2
**GEOMETRIC AND FLIGHT PARAMETERS**

| \( y / x \) | 0.216 | \( x / y \) | 0.0056 | \( x / y \) | 0.123 |
|---|---|---|---|---|
| \( x / y \) | 0.25 | \( x / y \) | 0.25 |

### SUB-PROCEDURE 3
**COMPUTATION OF SHOULDER SECTIONAL RADIAL FORCE AND MOMENT COEFFICIENTS AND CENTER OF PRESSURE**

1. Write the first three elements of the curve 5 as the elements of curves 62, 63, and 64 respectively.

2. \( 66 = 62 \times 66 \)
   \( 69 = 62 \times 67 \)
   \( c_6 = 69 + 66 + 69 \)

3. \( 71 = 62 \times 70 \)
   \( 72 = 64 \times 72 \)
   \( c_7 = 71 + 71 + 73 \)

4. \( r_{cp} = 74 + 67 \)
   \( c_{72} = 71 + 73 + 75 \)

### FIGURE 9
**COMPLETED WORKSHEET I FOR PARAMETERS**

<table>
<thead>
<tr>
<th>( r )</th>
<th>( r_0 )</th>
<th>( r_1 )</th>
<th>( r_2 )</th>
</tr>
</thead>
</table>
| \( 62 = 62 - 0.79 \)
| \( 63 = 62 - 0.80 \)
| \( 64 = 62 - 0.79 \)
| \( 65 = 62 - 0.76 \)
| \( 66 = 62 - 0.76 \)
| \( 67 = 62 - 0.75 \)
| \( 68 = 62 - 0.76 \)
| \( 69 = 62 - 0.76 \)
| \( 10 = 62 - 0.76 \)
| \( 11 = 62 - 0.76 \)
| \( 12 = 62 - 0.76 \)

<table>
<thead>
<tr>
<th>( y )</th>
<th>( x )</th>
<th>( \theta )</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 0.1046 )</td>
<td>( 0.0272 )</td>
<td>( -0.3056 )</td>
<td>0</td>
</tr>
<tr>
<td>( 0.001 )</td>
<td>( 0.0005 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.0004 )</td>
<td>( 0.0005 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.001 )</td>
<td>( 0.0015 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.002 )</td>
<td>( 0.0025 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.003 )</td>
<td>( 0.0035 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.004 )</td>
<td>( 0.0045 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.005 )</td>
<td>( 0.0055 )</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>( 0.006 )</td>
<td>( 0.0065 )</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### COMPUTATION OF THREE-DIMENSIONAL CAMBER COEFFICIENTS

#### SUB-PROCEDURE 2

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of column 5 as the first element of column 7, 9, 11, 13, 15, 17 and 19 respectively.

#### SUB-PROCEDURE 4

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of column 6, corresponding to \( \eta = 5 \), as the elements of column 8.

#### FOR PARAMETRIC STUDY EXAMPLE

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the second element of column 6, corresponding to \( \eta = 5 \), as the element of column 9.

#### SUB-PROCEDURE 3

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the first seven elements of column 9 as the first element of columns 41, 43, 45, 47, 49, 51 and 53 respectively.

#### EFFECTIVE COMPLIANCE

<table>
<thead>
<tr>
<th>( \eta )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Write the elements of columns 39 and 54 as the elements of columns 41, 43, 45, 47, 49, 51 and 53 respectively.

#### FIGURE 9

FOR PARAMETRIC STUDY EXAMPLE
FIGURE 10

VARIATION OF SHROUD THRUST COEFFICIENT $C_t$ WITH SHROUD INCIDENCE $i$
OTHER PARAMETERS FIXED
by the product of the three-dimensional Glauert coefficients of the effective camber and the two-dimensional Glauert coefficients of the propeller induced camber. With all parameters fixed, except $i$, the three-dimensional Glauert coefficients of the effective camber are independent of shroud incidence. Therefore, the shroud thrust coefficient will also be proportional to the shroud incidence.

The crossover point on Fig. 10 where $C_d = 0.0$ determines the value of shroud incidence at which the shroud has no effect on the inflow to the propeller. For angles to the right of this point the shroud will increase the inflow and for angles to the left of this point it will decrease the inflow to the propeller.
REFERENCES


SUB-PROCEDURE 1
DETERMINATION OF PARAMETERS
(Use WORKSHEET I)

1. For the configuration to be evaluated, enter \( N \), the NACA airfoil section designation, and the NACA mean line designation in the appropriate locations below the figure on WORKSHEET I. Also fill in all the dimensions \( c, R, \ldots \), indicated on the figure itself with these exceptions:

   i. \( x_m \) and \( y_m \) are applicable only when an NACA 4-digit mean line is being used.

   ii. \( x_a \) and the inset in the figure on WORKSHEET I are applicable only when an NACA 6-digit mean line is being used.

The following sign conventions must be observed:

   i. \( x_p, x_m \) and \( x_a \) are positive or negative depending on their location relative to the chosen coordinate system, i.e., positive to the right of the midchord and negative to the left.

   ii. \( y_m \) is measured relative to the chord line, and is positive when above and negative when below this reference.

   iii. All other dimensions are positive.
iv. i is positive in a counter-clockwise sense.

Record the physical flight conditions $T$, $U$, $\Omega$ and $\rho$.

2. Compute the remaining parameters from the equations which are given and the data from step 1. Write the results in the columns headed **actual**. The following exceptions should be noted:

i. $p$ and $m$ are applicable only when an NACA 4-digit mean line is being used.

ii. $\alpha$ and $c_{f_i}$ are applicable only when an NACA 6-digit line is being used. $c_{f_i}$ is presumably known and is simply written down; it is positive if the mean line is concave downward ($\sim$) and negative, if concave upward ($\sim$).

3. Use the TABLE OF PARAMETERS and choose where necessary the values of the tabulated parameters which are closest to (larger or smaller) or equal to the actual values; write these values in the indicated locations under the column headed **evaluated**. For the parameters which can have arbitrary values, use the actual values in the evaluation except for $t_m/c$. The value to use for $t_m/c$ is described in the next step.

4. For finite thickness, compute the consistent value of $t_m/c$ to be used in the evaluation as follows:
i. Use the value of $e$, $\mu$ and $\lambda$ from the column headed \textit{Evaluated}, and find the corresponding shroud thickness ratio at the propeller plane $t_p/c$ from TABLE 2.1.

ii. Multiply the value of $x$ in the column headed \textit{Evaluated} by the value of $c$ and obtain a "new" value of $x_p$.

iii. Using the actual configuration determine the "new" value of $t_p$ corresponding to the "new" value of $x_p$.

iv. Take $t_m$ from the figure on WORKSHEET I and with the "new" value of $t_p$, form the ratio $t_m/t_p$ and multiply it by the value of $t_p/c$ from TABLE 2.1. Enter the result in the location $t_m/c$ in the column headed \textit{Evaluated}.

For zero thickness, use the value 0 in the evaluation.

5. In the remaining sub-procedures, the values of all parameters required will be taken from the column headed \textit{Evaluated}. 
SUB-PROCEDURE 2

COMPUTATION OF THREE-DIMENSIONAL GLAUERT COEFFICIENTS
OF EFFECTIVE CAMBER

(Use WORKSHEET 1)

1. Write the value of \( t_m/c \) in COLUMN 2.
2. Write the value of \( C_T \) in COLUMN 32.
3. Write the appropriate GEOMETRIC CAMBER PARAMETERS in the indicated columns as follows:
   i. For an NACA 4-digit mean line write the value of \( m \) in COLUMN 28 and the value \( 2i \) in COLUMN 30.
   ii. For an NACA 5-digit mean line write the value 1 in COLUMN 28 if the mean line is concave downward, or the value -1 if the mean line is concave upward; also write the value \( 2i \) in COLUMN 30.
   iii. For an NACA 6-digit mean line, write the value \( c_y \) in COLUMN 28 and the value \( 2i \) in COLUMN 30.
4. Use the value of \( \lambda \) and the THICKNESS PARAMETERS to pick the coefficients of the shroud source strength distribution \( a_\nu \) from TABLES 3.1 - 3.2 and proceed as follows:
   i. For an NACA 4- or 5-digit airfoil, write the appropriate column of numbers from TABLE 3.1 in COLUMN 1 and the value 1 in COLUMN 3.
ii. For an NACA 6-digit airfoil, choose the column headings in TABLE 3.2 corresponding to the 6-digit family with the same or closest smaller value of $t_m/c$ and write this column of numbers in COLUMN 1; if the table does not contain a smaller value of $t_m/c$, use the column with the smallest value of $t_m/c$ available. Also write the value of $t_m/c$ from the column heading used in COLUMN 3.

iii. For zero thickness, write the value 0 in all the elements of COLUMN 34.

5. Use the value of $\lambda$ to pick the elements for the evaluation of the camber induced by shroud thickness $Q_k$ from TABLES 4.1 - 4.3. Write each column of numbers from the appropriate table in columns 6, 8, 10, 12, 14, 16 and 18 respectively. For zero thickness, omit this step.

6. Use the geometric camber parameters to pick the two-dimensional Glauert coefficients of the geometric camber $\epsilon$ from TABLES 5.1 - 5.3. Write the column of numbers from the appropriate table in COLUMN 27. For NACA 4-digit mean lines, with $p = 0.40, 0.30, 0.25, 0.20,$ or $0.10$ use the data for the corresponding negative value of $p$ with the sign of the numbers for $\nu = 0, 2, 4, 6, 8, 10$ and 12 reversed.
7. Use the values of the gross geometric and flight parameters to
pick the two-dimensional Glauert coefficients of the propeller
induced camber \( \epsilon_{\Gamma, \nu} \) from TABLES 6.1 - 6.18. Write the
column of numbers from the appropriate table in column 31. For
\( x = 0.25 \), use the tables for \( x = -0.25 \) with the sign of the num-
bers corresponding to \( \nu = 1, 3, 5, 7, 9 \) and 11 reversed.

8. Use the value of \( \lambda \) to pick the elements for the curvature cor-
rection of the two-dimensional Glauert coefficients of the effective
shroud camber \( c_{\mathrm{k, l, \nu}} \) from TABLES 7.1 - 7.3. Write each col-
umn of numbers from the appropriate table in columns 40, 42, 44,
46, 48, 50 and 52 respectively.

9. Compute the three-dimensional Glauert coefficients of the effective
camber \( c_{\nu}^{3D} \) by following the instructions given in SUB-
PROCEDURE 2 on WORKSHEET I; for zero thickness, omit the
instructions in steps 1, 2 and 3.
SUB-PROCEDURE 3

COMPUTATION OF
SHROUD SECTIONAL RADIAL FORCE AND MOMENT COEFFICIENTS
AND
CENTER OF PRESSURE

(Use WORKSHEET I)

1. Compute the shroud sectional radial force coefficient $c_r$, the
   pitching moment coefficient $c_m$, and the nondimensional center
   of pressure $x_{cp}/c$ by following the instructions given in SUB-
   PROCEDURE 3 on WORKSHEET I.
SUB-PROCEDURE 4

COMPUTATION OF SHROUD THRUST COEFFICIENT

(Use WORKSHEET I)

1. Use the values of the GROSS GEOMETRIC AND FLIGHT PARAMETERS to pick the terms of the propeller-shroud thickness contribution to the shroud thrust coefficient $C_{\Gamma' t_v}$ from TABLES 8.1 - 8.27. Write the column of numbers from the appropriate table in COLUMN 78. For zero thickness, omit this step and write the value 0 in all the elements of COLUMN 82.

2. Write the value of $C_T$ in COLUMN 81, the value of $\mu$ in COLUMN 111, and the value of $\nu$ in COLUMN 112.

3. Compute the shroud thrust coefficient $C_t$ by following the instructions given in SUB-PROCEDURE 4 on WORKSHEET II; for zero thickness, omit the instructions in STEP 1.
1. Compute the net shroud pressure coefficient $\Delta c_p(x/c)$ by following the instructions given in SUB-PROCEDURE 5 on WORKSHEET II.
SUB-PROCEDURE 6

COMPUTATION OF OUTER AND INNER SHROUD SURFACE PRESSURE COEFFICIENTS

(Use WORKSHEET II)

1. Write the value of \( C_T \) in \textit{column 227}.

2. Write the value of \( t_m/c \) in \textit{column 228}.

3. Use the value of \( \lambda \) to pick the elements for the shroud curvature contribution to the shroud surface pressure arising from the effective shroud camber \( S_{k,\ell} \) from TABLES 9.1 - 9.3. Write each column of numbers from the appropriate table in columns 160, 162, 164, 166, 168, 170 and 172 respectively.

4. Use the value of \( \lambda \) to pick the elements for the shroud curvature contribution to the shroud surface pressure arising from the shroud thickness \( T_{k,\ell} \) from TABLES 10.1 - 10.3. Write each column of numbers from the appropriate table in columns 174, 176, 178, 180, 182, 184 and 186 respectively. For zero thickness, omit this step.

5. Use the values of the gross geometric and flight parameters to pick the direct propeller contribution to the shroud surface pressure coefficients \( c_{r,(x/c)} \) from TABLES 11.1 - 11.18. Write the column of numbers from the appropriate table in \textit{column 226}. 
For $x = 0.25$, use the tables for $x = -0.25$ but invert each column and reverse the sign of each number.

6. Use the values of the \textbf{THICKNESS PARAMETERS} to pick the linearized, two-dimensional contribution of shroud thickness to the shroud surface pressure coefficient $c_f^{2D} (x/c)$ from TABLES 12.1 - 12.2 as follows:

i. For an NACA 4- or 5-digit airfoil, choose the column heading in TABLE 12.1 having the same or closest smaller value of $t_m/c$ and write this column of numbers in \textbf{COLUMN 231}. Also write the value of $t_m/c$ from the column heading used in \textbf{COLUMN 229}.

ii. For an NACA 6-digit airfoil, choose the column headings in TABLE 12.2 corresponding to the 6-digit family with the same or closest smaller value of $t_m/c$ and write this column of numbers in \textbf{COLUMN 231}; if the tables do not contain a smaller value of $t_m/c$, use the column with the smallest value of $t_m/c$ available. Also write the value of $t_m/c$ from the column heading used in \textbf{COLUMN 229}.

iii. For zero thickness, write the value 0 in all the elements of \textbf{COLUMNS 195, 196, 197, 198, 199, 200 and 201}.

7. Compute the net shroud surface pressure coefficient by using \textbf{SUB-PROCEDURE 5}.
8. Compute the shroud outer and inner surface pressure coefficients $c_p(\text{OUTER})$ and $c_p(\text{INNER})$ respectively by following the instructions given in SUB-PROCEDURE 6 on WORKSHEET II; for zero thickness, omit the instructions in steps 2, 4 and 8. In this subprocedure the quadratic form of the two-dimensional thickness contribution to the shroud surface pressure is used. If it is desired to use the linearized form, then follow the last instruction of step 9.
TABLES 1.1 - 1.3

NON-DIMENSIONAL PROPELLER CIRCULATION DISTRIBUTION $\Gamma(\beta)/R_p U$
NORMALIZED SUCH THAT $C_T = 1$

$$ \frac{\Gamma(\beta)}{R_p U} = A \frac{2\pi J}{N} \frac{\cos^2 \beta}{J^2 + \cos^2 \beta} \frac{F(\varphi, k)}{F(\pi/2, k)} $$

$$ \cos \beta \equiv r/R_p \quad ; \quad \sin \varphi = \left[ \frac{k^2 - \text{sech}^2 \frac{N}{2eJ} \sqrt{\frac{J^2 + 1}{2eJ}} (1 - e \cos \beta)}{k^2 \tanh^2 \frac{N}{2eJ} \sqrt{\frac{J^2 + 1}{2eJ}} (1 - e \cos \beta)} \right]^{1/2} \quad ; \quad k \equiv \text{sech} \frac{N}{2eJ} \sqrt{\frac{J^2 + 1}{2eJ}} (1-e) $$

$$ A = \left[ \frac{2N}{\pi J} \int_0^{\pi/2} \frac{\Gamma(\beta)}{AR_p U} \cos \beta \sin \beta \, d\beta \right]^{-1} $$

Accuracy: $\pm 0.0001$
### Table 1.1

**Non-Dimensional Propeller Circulation Distribution \( \Gamma(u)/R \nu **

<table>
<thead>
<tr>
<th>( J^0 )</th>
<th>( r/R_p )</th>
<th>( J=0.25 )</th>
<th>( J=0.5 )</th>
<th>( J=0.75 )</th>
<th>( J=0.25 )</th>
<th>( J=0.5 )</th>
<th>( J=0.75 )</th>
<th>( J=0.25 )</th>
<th>( J=0.5 )</th>
<th>( J=0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0.996</td>
<td>0.0225</td>
<td>0.1677</td>
<td>0.2943</td>
<td>0.0760</td>
<td>0.1750</td>
<td>0.2943</td>
<td>0.0809</td>
<td>0.1806</td>
<td>0.2878</td>
</tr>
<tr>
<td>10</td>
<td>0.985</td>
<td>0.1247</td>
<td>0.3087</td>
<td>0.5245</td>
<td>0.1294</td>
<td>0.3198</td>
<td>0.5423</td>
<td>0.1455</td>
<td>0.3344</td>
<td>0.5678</td>
</tr>
<tr>
<td>15</td>
<td>0.965</td>
<td>0.1844</td>
<td>0.4506</td>
<td>0.7102</td>
<td>0.1866</td>
<td>0.4598</td>
<td>0.7272</td>
<td>0.1959</td>
<td>0.4646</td>
<td>0.7485</td>
</tr>
<tr>
<td>20</td>
<td>0.940</td>
<td>0.2235</td>
<td>0.5066</td>
<td>0.8490</td>
<td>0.2267</td>
<td>0.5144</td>
<td>0.8609</td>
<td>0.2305</td>
<td>0.5240</td>
<td>0.8765</td>
</tr>
<tr>
<td>25</td>
<td>0.906</td>
<td>0.2541</td>
<td>0.5715</td>
<td>0.9456</td>
<td>0.2562</td>
<td>0.5767</td>
<td>0.9599</td>
<td>0.2586</td>
<td>0.5829</td>
<td>0.9636</td>
</tr>
<tr>
<td>30</td>
<td>0.866</td>
<td>0.2777</td>
<td>0.6185</td>
<td>1.0062</td>
<td>0.2788</td>
<td>0.6212</td>
<td>1.0122</td>
<td>0.2799</td>
<td>0.6244</td>
<td>1.0167</td>
</tr>
<tr>
<td>35</td>
<td>0.819</td>
<td>0.2951</td>
<td>0.6492</td>
<td>1.0366</td>
<td>0.2953</td>
<td>0.6497</td>
<td>1.0389</td>
<td>0.2954</td>
<td>0.6502</td>
<td>1.0390</td>
</tr>
<tr>
<td>40</td>
<td>0.766</td>
<td>0.3069</td>
<td>0.6640</td>
<td>1.0580</td>
<td>0.3061</td>
<td>0.6627</td>
<td>1.0554</td>
<td>0.3057</td>
<td>0.6610</td>
<td>1.0519</td>
</tr>
<tr>
<td>45</td>
<td>0.707</td>
<td>0.3132</td>
<td>0.6624</td>
<td>1.0666</td>
<td>0.3123</td>
<td>0.6599</td>
<td>1.0017</td>
<td>0.3109</td>
<td>0.6564</td>
<td>0.9937</td>
</tr>
<tr>
<td>50</td>
<td>0.643</td>
<td>0.3142</td>
<td>0.6434</td>
<td>0.9443</td>
<td>0.3129</td>
<td>0.6397</td>
<td>0.9580</td>
<td>0.3112</td>
<td>0.6352</td>
<td>0.9203</td>
</tr>
<tr>
<td>55</td>
<td>0.574</td>
<td>0.3056</td>
<td>0.6050</td>
<td>0.8515</td>
<td>0.3081</td>
<td>0.6008</td>
<td>0.8447</td>
<td>0.3061</td>
<td>0.5955</td>
<td>0.8362</td>
</tr>
<tr>
<td>60</td>
<td>0.500</td>
<td>0.2903</td>
<td>0.5455</td>
<td>0.7202</td>
<td>0.2997</td>
<td>0.5411</td>
<td>0.7235</td>
<td>0.2946</td>
<td>0.5358</td>
<td>0.7153</td>
</tr>
<tr>
<td>65</td>
<td>0.423</td>
<td>0.2784</td>
<td>0.4654</td>
<td>0.5653</td>
<td>0.2769</td>
<td>0.4593</td>
<td>0.5794</td>
<td>0.2748</td>
<td>0.4554</td>
<td>0.4922</td>
</tr>
<tr>
<td>70</td>
<td>0.342</td>
<td>0.2462</td>
<td>0.3598</td>
<td>0.4261</td>
<td>0.2448</td>
<td>0.3564</td>
<td>0.4215</td>
<td>0.2429</td>
<td>0.3522</td>
<td>0.4158</td>
</tr>
<tr>
<td>75</td>
<td>0.259</td>
<td>0.1961</td>
<td>0.2412</td>
<td>0.2675</td>
<td>0.1949</td>
<td>0.2389</td>
<td>0.2644</td>
<td>0.1933</td>
<td>0.2360</td>
<td>0.2607</td>
</tr>
<tr>
<td>80</td>
<td>0.174</td>
<td>0.1256</td>
<td>0.1239</td>
<td>0.1205</td>
<td>0.1228</td>
<td>0.1227</td>
<td>0.1290</td>
<td>0.1218</td>
<td>0.1212</td>
<td>0.1261</td>
</tr>
<tr>
<td>85</td>
<td>0.087</td>
<td>0.0412</td>
<td>0.0342</td>
<td>0.0343</td>
<td>0.0400</td>
<td>0.0373</td>
<td>0.0338</td>
<td>0.0466</td>
<td>0.0334</td>
<td>0.0333</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 1.3

**Non-Dimensional Propeller Circulation Distribution** \( \Gamma(\theta)/\Omega U \)

<table>
<thead>
<tr>
<th>( \theta )</th>
<th>( \Gamma/\Gamma_p )</th>
<th>( \theta = 0.990 )</th>
<th>( \theta = 0.992 )</th>
<th>( \theta = 0.994 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0.996</td>
<td>0.0403</td>
<td>0.0876</td>
<td>0.1464</td>
</tr>
<tr>
<td>10</td>
<td>0.985</td>
<td>0.0747</td>
<td>0.1621</td>
<td>0.2702</td>
</tr>
<tr>
<td>15</td>
<td>0.966</td>
<td>0.1016</td>
<td>0.2206</td>
<td>0.3555</td>
</tr>
<tr>
<td>20</td>
<td>0.949</td>
<td>0.1223</td>
<td>0.2650</td>
<td>0.4358</td>
</tr>
<tr>
<td>25</td>
<td>0.906</td>
<td>0.1371</td>
<td>0.2976</td>
<td>0.4847</td>
</tr>
<tr>
<td>30</td>
<td>0.866</td>
<td>0.1470</td>
<td>0.3199</td>
<td>0.5147</td>
</tr>
<tr>
<td>35</td>
<td>0.819</td>
<td>0.1528</td>
<td>0.3227</td>
<td>0.5274</td>
</tr>
<tr>
<td>40</td>
<td>0.766</td>
<td>0.1552</td>
<td>0.3204</td>
<td>0.5233</td>
</tr>
<tr>
<td>45</td>
<td>0.707</td>
<td>0.1549</td>
<td>0.3311</td>
<td>0.5030</td>
</tr>
<tr>
<td>50</td>
<td>0.643</td>
<td>0.1525</td>
<td>0.3170</td>
<td>0.4671</td>
</tr>
<tr>
<td>55</td>
<td>0.574</td>
<td>0.1481</td>
<td>0.2938</td>
<td>0.4166</td>
</tr>
<tr>
<td>60</td>
<td>0.509</td>
<td>0.1412</td>
<td>0.2613</td>
<td>0.3532</td>
</tr>
<tr>
<td>65</td>
<td>0.432</td>
<td>0.1308</td>
<td>0.2192</td>
<td>0.2800</td>
</tr>
<tr>
<td>70</td>
<td>0.342</td>
<td>0.1152</td>
<td>0.1683</td>
<td>0.2017</td>
</tr>
<tr>
<td>75</td>
<td>0.259</td>
<td>0.0914</td>
<td>0.1119</td>
<td>0.1264</td>
</tr>
<tr>
<td>80</td>
<td>0.174</td>
<td>0.0755</td>
<td>0.0571</td>
<td>0.0602</td>
</tr>
<tr>
<td>85</td>
<td>0.087</td>
<td>0.0391</td>
<td>0.0135</td>
<td>0.0518</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
TABLE 2.1

SHROUD THICKNESS RATIO AT PROPELLER PLANE \( t_p/c \)

\[
t_p/c = \frac{1}{\lambda} \left(1 - \frac{\mu}{e}\right)
\]

Accuracy: ± 0.0001
### Table 2.1

<table>
<thead>
<tr>
<th>µ</th>
<th>0.000</th>
<th>0.001</th>
<th>0.002</th>
<th>0.003</th>
<th>0.004</th>
<th>0.005</th>
<th>0.006</th>
<th>0.007</th>
<th>0.008</th>
<th>0.009</th>
<th>0.010</th>
<th>0.011</th>
<th>0.012</th>
<th>0.013</th>
<th>0.014</th>
<th>0.015</th>
<th>0.016</th>
<th>0.017</th>
<th>0.018</th>
<th>0.019</th>
<th>0.020</th>
<th>0.021</th>
<th>0.022</th>
<th>0.023</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>2.336</td>
<td>2.332</td>
<td>2.328</td>
<td>2.324</td>
<td>2.319</td>
<td>2.315</td>
<td>2.310</td>
<td>2.306</td>
<td>2.302</td>
<td>2.297</td>
<td>2.292</td>
<td>2.287</td>
<td>2.283</td>
<td>2.278</td>
<td>2.273</td>
<td>2.268</td>
<td>2.263</td>
<td>2.258</td>
<td>2.253</td>
<td>2.248</td>
<td>2.243</td>
<td>2.238</td>
<td>2.233</td>
<td></td>
</tr>
<tr>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.003</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.004</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.005</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.006</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.007</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.008</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.009</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>0.01</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>
TABLES 3.1 - 3.2

COEFFICIENTS OF SHROUD SOURCE STRENGTH DISTRIBUTIONS $a_\nu$
FOR NACA 4-, 5- AND 6-DIGIT AIRFOIL SECTIONS
NORMALIZED SUCH THAT $t_m/c = 1$

See Ref. 5, Section 2.2. The coefficients for the NACA 4- and 5-digit airfoil
sections are five times those given in Table 2.1. The coefficients for the
6-digit sections are obtained by assuming a thickness distribution of the same
form and using a least-square curve fit to the appropriate data given in Ref. 13.

Estimated Accuracy: $\pm 0.0001$
<table>
<thead>
<tr>
<th>$\lambda$</th>
<th>$A_0$</th>
<th>$A_1$</th>
<th>$A_2$</th>
<th>$A_3$</th>
<th>$A_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0000</td>
<td>1.0000</td>
<td>-2.1513</td>
<td>-2.1513</td>
<td>1.0000</td>
</tr>
<tr>
<td>1</td>
<td>-2.1513</td>
<td>-2.1513</td>
<td>1.0100</td>
<td>1.0000</td>
<td>-1.0000</td>
</tr>
<tr>
<td>2</td>
<td>1.0000</td>
<td>1.0000</td>
<td>-1.0000</td>
<td>-1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>3</td>
<td>-1.0000</td>
<td>-1.0000</td>
<td>2.0000</td>
<td>2.0000</td>
<td>-2.0000</td>
</tr>
<tr>
<td>4</td>
<td>2.0000</td>
<td>2.0000</td>
<td>-2.0000</td>
<td>-2.0000</td>
<td>2.0000</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 3.2

**Coefficients of Shroud Source Strength Distributions \( s_n \)**

<table>
<thead>
<tr>
<th>( \lambda )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m/c = 0.06 )</td>
<td>0.0516</td>
<td>0.0733</td>
<td>0.0894</td>
<td>0.0105</td>
<td>0.1421</td>
<td>0.1740</td>
<td>0.1424</td>
<td>0.2013</td>
<td>0.2465</td>
<td>0.1013</td>
<td>0.1433</td>
<td>0.1755</td>
</tr>
<tr>
<td>1</td>
<td>0.0164</td>
<td>0.0164</td>
<td>0.0164</td>
<td>-0.0353</td>
<td>-0.3553</td>
<td>-0.5553</td>
<td>-0.5271</td>
<td>-0.5271</td>
<td>-0.5271</td>
<td>-0.5271</td>
<td>-0.5271</td>
<td>-0.5271</td>
</tr>
<tr>
<td>2</td>
<td>-0.0197</td>
<td>-0.0398</td>
<td>-0.2066</td>
<td>-1.2050</td>
<td>-0.2066</td>
<td>-0.4026</td>
<td>-1.1942</td>
<td>-0.2110</td>
<td>-0.6140</td>
<td>-1.2094</td>
<td>-0.6997</td>
<td>-0.6565</td>
</tr>
<tr>
<td>3</td>
<td>1.4697</td>
<td>0.3674</td>
<td>0.1633</td>
<td>-0.6233</td>
<td>-0.9062</td>
<td>0.1028</td>
<td>6.5232</td>
<td>1.0321</td>
<td>0.7254</td>
<td>3.0918</td>
<td>0.2920</td>
<td>0.4102</td>
</tr>
<tr>
<td>4</td>
<td>4.5923</td>
<td>0.5137</td>
<td>0.1700</td>
<td>-9.4276</td>
<td>1.1784</td>
<td>0.3492</td>
<td>-16.9198</td>
<td>2.1750</td>
<td>-0.2607</td>
<td>15.5697</td>
<td>1.6451</td>
<td>0.5263</td>
</tr>
<tr>
<td>5</td>
<td>-2.5641</td>
<td>-0.1603</td>
<td>-0.0317</td>
<td>-8.3277</td>
<td>-0.5211</td>
<td>-0.1029</td>
<td>-15.0303</td>
<td>-0.5939</td>
<td>-0.1856</td>
<td>-24.7082</td>
<td>-1.5443</td>
<td>-0.2050</td>
</tr>
<tr>
<td>6</td>
<td>68.0900</td>
<td>2.1278</td>
<td>0.2802</td>
<td>113.4300</td>
<td>2.5447</td>
<td>0.4668</td>
<td>28.8781</td>
<td>2.0459</td>
<td>0.5245</td>
<td>82.0698</td>
<td>2.5644</td>
<td>0.3257</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m/c = 0.06 )</td>
<td>0.0514</td>
<td>0.0727</td>
<td>0.0893</td>
<td>0.1013</td>
<td>0.1433</td>
<td>0.1755</td>
<td>0.1466</td>
<td>0.2074</td>
</tr>
<tr>
<td>1</td>
<td>0.0164</td>
<td>0.0164</td>
<td>0.0164</td>
<td>-0.0344</td>
<td>-0.3444</td>
<td>-0.5444</td>
<td>-0.5201</td>
<td>-0.5201</td>
</tr>
<tr>
<td>2</td>
<td>-0.0175</td>
<td>-0.0358</td>
<td>-0.2358</td>
<td>-1.2094</td>
<td>-0.6997</td>
<td>-0.4665</td>
<td>-2.0926</td>
<td>-1.0453</td>
</tr>
<tr>
<td>3</td>
<td>1.3004</td>
<td>0.3475</td>
<td>0.1545</td>
<td>3.6918</td>
<td>0.9220</td>
<td>0.4102</td>
<td>6.0883</td>
<td>1.7021</td>
</tr>
<tr>
<td>4</td>
<td>7.6037</td>
<td>0.9617</td>
<td>0.2560</td>
<td>15.5697</td>
<td>1.9451</td>
<td>0.5763</td>
<td>23.9967</td>
<td>2.9996</td>
</tr>
<tr>
<td>5</td>
<td>-7.9214</td>
<td>-0.6551</td>
<td>-0.6978</td>
<td>-24.7082</td>
<td>-1.5443</td>
<td>-0.2050</td>
<td>-47.1444</td>
<td>-2.9465</td>
</tr>
<tr>
<td>6</td>
<td>46.6991</td>
<td>1.4553</td>
<td>0.1922</td>
<td>82.0698</td>
<td>2.5644</td>
<td>0.3257</td>
<td>88.1598</td>
<td>2.7550</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m/c = 0.06 )</td>
<td>0.0471</td>
<td>0.0666</td>
<td>0.0815</td>
<td>0.0904</td>
<td>0.1278</td>
</tr>
<tr>
<td>1</td>
<td>-0.1115</td>
<td>-0.1115</td>
<td>-0.1115</td>
<td>-0.2222</td>
<td>-0.2222</td>
</tr>
<tr>
<td>2</td>
<td>-0.6601</td>
<td>-0.3900</td>
<td>-0.2200</td>
<td>-1.4953</td>
<td>-0.7427</td>
</tr>
<tr>
<td>3</td>
<td>-2.0259</td>
<td>-0.6567</td>
<td>-0.2919</td>
<td>-4.9396</td>
<td>-1.2326</td>
</tr>
<tr>
<td>4</td>
<td>-6.7647</td>
<td>-0.8481</td>
<td>-0.2513</td>
<td>-13.8018</td>
<td>-0.4827</td>
</tr>
<tr>
<td>5</td>
<td>42.5875</td>
<td>2.6617</td>
<td>0.5258</td>
<td>89.2344</td>
<td>5.5771</td>
</tr>
<tr>
<td>6</td>
<td>274.1510</td>
<td>8.5685</td>
<td>1.1264</td>
<td>435.8718</td>
<td>12.9960</td>
</tr>
</tbody>
</table>
TABLES 4.1 - 4.3

ELEMENTS FOR EVALUATION OF CAMBER INDUCED BY SHROUD THICKNESS $Q_k, \ell$

See Ref. 5, Section 2.8. These elements have been taken directly from Tables 2.11 - 2.13.

Accuracy: $\pm 0.0001$
### Table 4.2

Elements for evaluation of camber induced by shroud thickness $Q_{k, l}$

<table>
<thead>
<tr>
<th>$l$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.704</td>
<td>0.240</td>
<td>0.0052</td>
<td>0.0002</td>
<td>0.0002</td>
<td>0.0002</td>
<td>0.0002</td>
</tr>
<tr>
<td>1</td>
<td>-0.1527</td>
<td>0.0125</td>
<td>0.0005</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0167</td>
<td>0.0272</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>3</td>
<td>-0.0041</td>
<td>0.0027</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>4</td>
<td>0.0018</td>
<td>0.0026</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>5</td>
<td>-0.0009</td>
<td>0.0004</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>6</td>
<td>0.0005</td>
<td>0.0008</td>
<td>0.0001</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

### Table 4.1

Elements for evaluation of camber induced by shroud thickness $Q_{k, l}$

<table>
<thead>
<tr>
<th>$l$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.704</td>
<td>0.240</td>
<td>0.0052</td>
<td>0.0002</td>
<td>0.0002</td>
<td>0.0002</td>
<td>0.0002</td>
</tr>
<tr>
<td>1</td>
<td>-0.1527</td>
<td>0.0125</td>
<td>0.0005</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0167</td>
<td>0.0272</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>3</td>
<td>-0.0041</td>
<td>0.0027</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>4</td>
<td>0.0018</td>
<td>0.0026</td>
<td>0.0003</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>5</td>
<td>-0.0009</td>
<td>0.0004</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>6</td>
<td>0.0005</td>
<td>0.0008</td>
<td>0.0001</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
### Table 4.3

**Elements for Evaluation of Camber Induced by Shroud Thickness \( \phi_{h,t} \)**

<table>
<thead>
<tr>
<th>( k )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.754</td>
<td>0.4770</td>
<td>0</td>
<td>0.0003</td>
<td>0</td>
<td>0.0001</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-0.2693</td>
<td>0</td>
<td>0.1244</td>
<td>0</td>
<td>0.0418</td>
<td>0</td>
<td>0.0168</td>
</tr>
<tr>
<td>2</td>
<td>0.0289</td>
<td>0.0035</td>
<td>0</td>
<td>-0.0091</td>
<td>0</td>
<td>-0.0066</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>-0.0054</td>
<td>0</td>
<td>-0.0252</td>
<td>0</td>
<td>-0.0023</td>
<td>0</td>
<td>0.0005</td>
</tr>
<tr>
<td>4</td>
<td>0.0032</td>
<td>0.0077</td>
<td>0</td>
<td>0.0015</td>
<td>0</td>
<td>0.0021</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>-0.0016</td>
<td>0</td>
<td>-0.0033</td>
<td>0</td>
<td>-0.0032</td>
<td>0</td>
<td>-0.0012</td>
</tr>
<tr>
<td>6</td>
<td>0.0008</td>
<td>0.0022</td>
<td>0</td>
<td>0.0015</td>
<td>0</td>
<td>0.0013</td>
<td>0</td>
</tr>
</tbody>
</table>
TABLES 5.1 - 5.3
TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF GEOMETRIC CAMBER $\varepsilon_{\nu}$
FOR NACA 4-, 5- AND 6-DIGIT MEAN LINES

$$\varepsilon_0 = \frac{2}{\pi} \int_0^{\pi} \varepsilon(\phi) \, d\phi \quad ; \quad \varepsilon_{\nu} = -\frac{4}{\pi} \int_0^{\pi} \varepsilon(\phi) \cos \nu \phi \, d\phi \quad , \quad \nu = 1, 2, \ldots, 12$$

NACA 4-Digit Mean Line For $m = 1$

$$\varepsilon(\phi) = \frac{(2p + \cos \phi)}{(\frac{1}{2} + p)^2} \quad , \quad 0 \leq \phi \leq \cos^{-1}(-2p)$$

$$\varepsilon(\phi) = \frac{(2p + \cos \phi)}{(\frac{1}{2} - p)^2} \quad , \quad \cos^{-1}(-2p) \leq \phi \leq \pi$$

FOR $p = 0.40, 0.30, 0.25, 0.20$ OR $0.10$, USE THE DATA FOR
THE CORRESPONDING NEGATIVE VALUE OF $p$, WITH THE
SIGN OF THE NUMBERS FOR $\nu = 0, 2, 4, 6, 8, 10$ AND $12$
REVERSED.
NACA 5-Digit Mean Line

\[ \epsilon(\phi) = \frac{k_1}{2m} \left( 3(1-\cos\phi)^2 - 12m(1-\cos\phi) + 4m^2(3-m) \right), \quad 0 \leq \phi \leq \cos^{-1}(1-2m) \]

See Ref. 13, P. 116, for values of \( m \) and \( k_1 \).

NACA 6-Digit Mean Line

\[ \epsilon(\phi) = \frac{-k_1}{g} \cdot m^3 \quad \cos^{-1}(1-2m) \leq \phi \leq \pi \]

\[ h \approx \frac{1}{(1-2\alpha)^2} \ln(1+\alpha)^2 - \ln(1-\alpha)^2 \quad \frac{1}{(1-2\alpha)^2} + g \]

\[ g \approx \frac{1}{(1-2\alpha)^2} \]

Accuracy: \( \pm 0.001 \)
### Table 5.1

Two-Dimensional Glauert Coefficients of Geometric Camber \( \zeta_c \)

<table>
<thead>
<tr>
<th>( \zeta_c )</th>
<th>( p=0.10 )</th>
<th>( p=0.20 )</th>
<th>( p=0.25 )</th>
<th>( p=0.30 )</th>
<th>( p=0.35 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.392</td>
<td>1.360</td>
<td>1.203</td>
<td>0.982</td>
<td>0.449</td>
</tr>
<tr>
<td>1</td>
<td>-12.709</td>
<td>-9.729</td>
<td>-0.116</td>
<td>-8.659</td>
<td>-8.150</td>
</tr>
<tr>
<td>2</td>
<td>-9.954</td>
<td>-5.943</td>
<td>-3.921</td>
<td>-2.964</td>
<td>-1.386</td>
</tr>
<tr>
<td>3</td>
<td>-7.243</td>
<td>-3.056</td>
<td>-1.960</td>
<td>-1.185</td>
<td>-0.277</td>
</tr>
<tr>
<td>4</td>
<td>-5.143</td>
<td>-1.182</td>
<td>-0.292</td>
<td>0.024</td>
<td>0.211</td>
</tr>
<tr>
<td>5</td>
<td>-3.071</td>
<td>0.073</td>
<td>0.392</td>
<td>0.408</td>
<td>0.149</td>
</tr>
<tr>
<td>6</td>
<td>-1.306</td>
<td>0.569</td>
<td>0.448</td>
<td>0.223</td>
<td>-0.048</td>
</tr>
<tr>
<td>7</td>
<td>-0.031</td>
<td>0.476</td>
<td>0.140</td>
<td>-0.070</td>
<td>-0.089</td>
</tr>
<tr>
<td>8</td>
<td>0.686</td>
<td>0.138</td>
<td>-0.140</td>
<td>-0.167</td>
<td>-0.001</td>
</tr>
<tr>
<td>9</td>
<td>0.897</td>
<td>-0.163</td>
<td>-0.186</td>
<td>-0.005</td>
<td>0.053</td>
</tr>
<tr>
<td>10</td>
<td>0.738</td>
<td>-0.241</td>
<td>-0.071</td>
<td>0.084</td>
<td>0.018</td>
</tr>
<tr>
<td>11</td>
<td>0.386</td>
<td>-0.133</td>
<td>0.071</td>
<td>0.086</td>
<td>-0.029</td>
</tr>
<tr>
<td>12</td>
<td>0.011</td>
<td>0.022</td>
<td>0.110</td>
<td>0.014</td>
<td>-0.022</td>
</tr>
</tbody>
</table>
TABLE 5.2
TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF GEOMETRIC CAMBER $c_g$

<table>
<thead>
<tr>
<th>$\phi$</th>
<th>MEAN-LINE 210</th>
<th>MEAN-LINE 220</th>
<th>MEAN-LINE 230</th>
<th>MEAN-LINE 240</th>
<th>MEAN-LINE 250</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.076</td>
<td>0.065</td>
<td>0.057</td>
<td>0.050</td>
<td>0.044</td>
</tr>
<tr>
<td>1</td>
<td>-0.196</td>
<td>-0.192</td>
<td>-0.191</td>
<td>-0.191</td>
<td>-0.191</td>
</tr>
<tr>
<td>2</td>
<td>-0.197</td>
<td>-0.192</td>
<td>-0.150</td>
<td>-0.145</td>
<td>-0.129</td>
</tr>
<tr>
<td>3</td>
<td>-0.171</td>
<td>-0.141</td>
<td>-0.114</td>
<td>-0.097</td>
<td>-0.061</td>
</tr>
<tr>
<td>4</td>
<td>-0.151</td>
<td>-0.106</td>
<td>-0.069</td>
<td>-0.036</td>
<td>-0.013</td>
</tr>
<tr>
<td>5</td>
<td>-0.128</td>
<td>-0.070</td>
<td>-0.030</td>
<td>-0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>6</td>
<td>-0.104</td>
<td>-0.039</td>
<td>-0.005</td>
<td>0.006</td>
<td>0.005</td>
</tr>
<tr>
<td>7</td>
<td>-0.080</td>
<td>-0.016</td>
<td>0.006</td>
<td>0.005</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>-0.057</td>
<td>-0.001</td>
<td>0.007</td>
<td>0.001</td>
<td>-0.002</td>
</tr>
<tr>
<td>9</td>
<td>-0.037</td>
<td>0.006</td>
<td>0.003</td>
<td>-0.002</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>-0.021</td>
<td>0.007</td>
<td>0.000</td>
<td>-0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>11</td>
<td>-0.008</td>
<td>0.005</td>
<td>-0.002</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.002</td>
<td>-0.002</td>
<td>0.001</td>
<td>0.000</td>
</tr>
</tbody>
</table>
### Table 5.3

**Two-Dimensional Glauert Coefficients of Geometric Camber \( \gamma \)**

<table>
<thead>
<tr>
<th>( \gamma )</th>
<th>( \delta -0.50 )</th>
<th>( \delta -0.40 )</th>
<th>( \delta -0.30 )</th>
<th>( \delta -0.20 )</th>
<th>( \delta -0.10 )</th>
<th>( \delta -0.0 )</th>
<th>( \delta +0.0 )</th>
<th>( \delta +0.10 )</th>
<th>( \delta +0.20 )</th>
<th>( \delta +0.30 )</th>
<th>( \delta +0.40 )</th>
<th>( \delta +0.50 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.159</td>
<td>0.155</td>
<td>0.146</td>
<td>0.124</td>
<td>0.121</td>
<td>0.106</td>
<td>0.096</td>
<td>0.072</td>
<td>0.064</td>
<td>0.054</td>
<td>0.032</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-0.637</td>
<td>-0.037</td>
<td>-0.027</td>
<td>-0.027</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
<td>-0.037</td>
</tr>
<tr>
<td>2</td>
<td>-0.424</td>
<td>-0.417</td>
<td>-0.396</td>
<td>-0.366</td>
<td>-0.327</td>
<td>-0.283</td>
<td>-0.233</td>
<td>-0.180</td>
<td>-0.123</td>
<td>-0.063</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>-0.212</td>
<td>-0.198</td>
<td>-0.197</td>
<td>-0.190</td>
<td>-0.096</td>
<td>-0.071</td>
<td>-0.059</td>
<td>-0.049</td>
<td>-0.040</td>
<td>-0.029</td>
<td>-0.127</td>
<td>-0.127</td>
</tr>
<tr>
<td>4</td>
<td>-0.179</td>
<td>-0.153</td>
<td>-0.126</td>
<td>-0.107</td>
<td>-0.103</td>
<td>-0.113</td>
<td>-0.120</td>
<td>-0.142</td>
<td>-0.136</td>
<td>-0.095</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>-0.127</td>
<td>-0.110</td>
<td>-0.092</td>
<td>-0.090</td>
<td>-0.099</td>
<td>-0.097</td>
<td>-0.097</td>
<td>-0.097</td>
<td>-0.097</td>
<td>-0.097</td>
<td>-0.097</td>
<td>-0.097</td>
</tr>
<tr>
<td>6</td>
<td>-0.109</td>
<td>-0.093</td>
<td>-0.086</td>
<td>-0.090</td>
<td>-0.087</td>
<td>-0.073</td>
<td>-0.056</td>
<td>-0.054</td>
<td>-0.054</td>
<td>-0.054</td>
<td>-0.054</td>
<td>-0.054</td>
</tr>
<tr>
<td>7</td>
<td>-0.091</td>
<td>-0.078</td>
<td>-0.077</td>
<td>-0.075</td>
<td>-0.062</td>
<td>-0.051</td>
<td>-0.053</td>
<td>-0.063</td>
<td>-0.052</td>
<td>-0.022</td>
<td>-0.022</td>
<td>-0.022</td>
</tr>
<tr>
<td>8</td>
<td>-0.081</td>
<td>-0.070</td>
<td>-0.071</td>
<td>-0.062</td>
<td>-0.052</td>
<td>-0.054</td>
<td>-0.058</td>
<td>-0.047</td>
<td>-0.055</td>
<td>-0.055</td>
<td>-0.055</td>
<td>-0.055</td>
</tr>
<tr>
<td>9</td>
<td>-0.071</td>
<td>-0.063</td>
<td>-0.061</td>
<td>-0.050</td>
<td>-0.049</td>
<td>-0.052</td>
<td>-0.042</td>
<td>-0.035</td>
<td>-0.046</td>
<td>-0.031</td>
<td>-0.071</td>
<td>-0.071</td>
</tr>
<tr>
<td>10</td>
<td>-0.064</td>
<td>-0.059</td>
<td>-0.054</td>
<td>-0.047</td>
<td>-0.049</td>
<td>-0.043</td>
<td>-0.036</td>
<td>-0.043</td>
<td>-0.036</td>
<td>-0.022</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>-0.058</td>
<td>-0.054</td>
<td>-0.046</td>
<td>-0.045</td>
<td>-0.043</td>
<td>-0.035</td>
<td>-0.038</td>
<td>-0.035</td>
<td>-0.027</td>
<td>-0.026</td>
<td>-0.054</td>
<td>-0.054</td>
</tr>
<tr>
<td>12</td>
<td>-0.053</td>
<td>-0.050</td>
<td>-0.043</td>
<td>-0.043</td>
<td>-0.035</td>
<td>-0.036</td>
<td>-0.036</td>
<td>-0.028</td>
<td>-0.028</td>
<td>-0.025</td>
<td>-0.022</td>
<td>0</td>
</tr>
</tbody>
</table>
TABLES 6.1 - 6.18

TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF PROPELLER INDUCED CAMBER $\epsilon_{\Gamma',\nu}$ FOR $C_T = 1$

$$\epsilon_{\Gamma',0} = \frac{2}{\pi} \int_0^\pi \epsilon_{\Gamma',\phi} \, d\phi \quad ; \quad \epsilon_{\Gamma',\nu} = -\frac{4}{\pi} \int_0^\pi \epsilon_{\Gamma',\phi} \cos \nu \phi \, d\phi , \quad \nu = 1, 2, \ldots 12$$

$$\epsilon_{\Gamma',\phi} \equiv \frac{N\mu}{8\pi J} \int_0^{\pi/2} \frac{\Gamma(\beta)}{P^2 U \sin \beta} \left[ (\mu \cos \beta + \omega) Q_{-\frac{1}{2}}(\omega) - (\omega \mu \cos \beta - 1) Q_{\frac{1}{2}}(\omega) \right] \, d\beta$$

$$\omega \equiv 1 + \frac{\lambda^2 (\cos \phi + 2x)^2 + (1 - \mu \cos \beta)^2}{2 \mu \cos \beta}$$

Accuracy: $\pm 0.001$

FOR $x = 0.25$, USE THE DATA FOR $x = -0.25$ WITH THE SIGN OF THE NUMBERS FOR $\nu = 1, 3, 5, 7, 9$ AND 11 REVERSED.
<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\beta$</th>
<th>$\gamma$</th>
<th>$\delta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.1:** Two-dimensional Glaubert Coefficients of Propeller Induced Camber \( 'c' \)
### Table 6.2

**Two-Dimensional Clauser Coefficients of Propeller Induced Camber**

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.236</td>
<td>-0.250</td>
<td>-0.264</td>
<td>-0.193</td>
<td>-0.195</td>
<td>-0.196</td>
<td>-0.153</td>
<td>-0.154</td>
<td>-0.155</td>
</tr>
<tr>
<td>1</td>
<td>0.079</td>
<td>0.065</td>
<td>0.089</td>
<td>0.010</td>
<td>0.106</td>
<td>0.109</td>
<td>0.102</td>
<td>0.104</td>
<td>0.106</td>
</tr>
<tr>
<td>2</td>
<td>-0.033</td>
<td>-0.035</td>
<td>-0.036</td>
<td>-0.042</td>
<td>-0.044</td>
<td>-0.045</td>
<td>0.044</td>
<td>0.045</td>
<td>0.046</td>
</tr>
<tr>
<td>3</td>
<td>-0.022</td>
<td>-0.025</td>
<td>-0.027</td>
<td>-0.046</td>
<td>-0.050</td>
<td>-0.053</td>
<td>-0.059</td>
<td>-0.062</td>
<td>-0.065</td>
</tr>
<tr>
<td>4</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.016</td>
<td>-0.020</td>
<td>-0.021</td>
</tr>
<tr>
<td>5</td>
<td>0.004</td>
<td>0.004</td>
<td>0.006</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.014</td>
<td>0.015</td>
<td>0.015</td>
</tr>
<tr>
<td>6</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
<td>0.010</td>
<td>0.012</td>
<td>0.013</td>
<td>0.018</td>
<td>0.019</td>
<td>0.021</td>
</tr>
<tr>
<td>7</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>8</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.006</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.003</td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.003</td>
<td>0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
<th>$x=0.900$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.216</td>
<td>-0.223</td>
<td>-0.239</td>
<td>-0.229</td>
<td>-0.232</td>
<td>-0.234</td>
<td>-0.180</td>
<td>-0.181</td>
<td>-0.182</td>
</tr>
<tr>
<td>1</td>
<td>0.123</td>
<td>0.132</td>
<td>0.140</td>
<td>0.120</td>
<td>0.136</td>
<td>0.140</td>
<td>0.124</td>
<td>0.127</td>
<td>0.129</td>
</tr>
<tr>
<td>2</td>
<td>-0.053</td>
<td>-0.057</td>
<td>-0.060</td>
<td>-0.059</td>
<td>-0.062</td>
<td>-0.064</td>
<td>-0.058</td>
<td>-0.060</td>
<td>-0.062</td>
</tr>
<tr>
<td>3</td>
<td>-0.055</td>
<td>-0.061</td>
<td>-0.066</td>
<td>-0.077</td>
<td>-0.080</td>
<td>-0.083</td>
<td>-0.085</td>
<td>-0.090</td>
<td>-0.095</td>
</tr>
<tr>
<td>4</td>
<td>-0.018</td>
<td>-0.017</td>
<td>-0.019</td>
<td>-0.025</td>
<td>-0.028</td>
<td>-0.030</td>
<td>-0.030</td>
<td>-0.033</td>
<td>-0.035</td>
</tr>
<tr>
<td>5</td>
<td>0.012</td>
<td>0.013</td>
<td>0.015</td>
<td>0.018</td>
<td>0.021</td>
<td>0.022</td>
<td>0.022</td>
<td>0.024</td>
<td>0.026</td>
</tr>
<tr>
<td>6</td>
<td>0.015</td>
<td>0.017</td>
<td>0.018</td>
<td>0.023</td>
<td>0.030</td>
<td>0.033</td>
<td>0.035</td>
<td>0.038</td>
<td>0.041</td>
</tr>
<tr>
<td>7</td>
<td>0.005</td>
<td>0.005</td>
<td>0.006</td>
<td>0.010</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
<td>0.015</td>
<td>0.016</td>
</tr>
<tr>
<td>8</td>
<td>-0.004</td>
<td>-0.005</td>
<td>-0.005</td>
<td>-0.009</td>
<td>-0.010</td>
<td>-0.011</td>
<td>-0.011</td>
<td>-0.012</td>
<td>-0.014</td>
</tr>
<tr>
<td>9</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.012</td>
<td>-0.015</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
<td>-0.022</td>
</tr>
<tr>
<td>10</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.008</td>
<td>-0.009</td>
</tr>
<tr>
<td>11</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.005</td>
<td>0.005</td>
<td>0.006</td>
<td>0.007</td>
<td>0.007</td>
<td>0.008</td>
</tr>
<tr>
<td>12</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \nu )</td>
<td>( J = 0.25 )</td>
<td>( J = 0.50 )</td>
<td>( J = 0.75 )</td>
<td>( J = 0.25 )</td>
<td>( J = 0.50 )</td>
<td>( J = 0.75 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.257</td>
<td>0.266</td>
<td>0.266</td>
<td>0.547</td>
<td>0.546</td>
<td>0.546</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.081</td>
<td>0.086</td>
<td>0.086</td>
<td>0.103</td>
<td>0.105</td>
<td>0.106</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-0.033</td>
<td>-0.035</td>
<td>-0.037</td>
<td>-0.043</td>
<td>-0.044</td>
<td>-0.045</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.023</td>
<td>-0.025</td>
<td>-0.027</td>
<td>-0.047</td>
<td>-0.050</td>
<td>-0.052</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.001</td>
<td>0.004</td>
<td>0.005</td>
<td>0.010</td>
<td>0.011</td>
<td>0.011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.920 )</th>
<th>( \lambda = 0.920 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( J = 0.25 )</td>
</tr>
<tr>
<td>0</td>
<td>0.318</td>
</tr>
<tr>
<td>1</td>
<td>0.126</td>
</tr>
<tr>
<td>2</td>
<td>0.054</td>
</tr>
<tr>
<td>3</td>
<td>-0.058</td>
</tr>
<tr>
<td>4</td>
<td>-0.016</td>
</tr>
<tr>
<td>5</td>
<td>0.013</td>
</tr>
<tr>
<td>6</td>
<td>0.016</td>
</tr>
<tr>
<td>7</td>
<td>0.005</td>
</tr>
<tr>
<td>8</td>
<td>-0.005</td>
</tr>
<tr>
<td>9</td>
<td>-0.006</td>
</tr>
<tr>
<td>10</td>
<td>-0.002</td>
</tr>
<tr>
<td>11</td>
<td>0.002</td>
</tr>
<tr>
<td>12</td>
<td>0.003</td>
</tr>
</tbody>
</table>
### Table 6.4

**Two-Dimensional Glauert Coefficients of Propeller Induced Camber**

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
</tbody>
</table>

### \( \lambda = 0.90 \)

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
</tbody>
</table>
### Table 6.5

Two-dimensional Glauert Coefficients of Propeller Induced Camber \( e \) vs. \( \lambda \)

<table>
<thead>
<tr>
<th>( \lambda ) Vs.</th>
<th>( e ) Vs.</th>
<th>( e ) Vs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
</tbody>
</table>

Note: The table shows the variation of Glauert coefficients with different values of \( \lambda \) and \( e \).
TABLE 6.6

TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF PROPELLER INDUCED CAMBER $c''_n$

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$\nu$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.257</td>
<td>-0.262</td>
<td>-0.265</td>
<td>0</td>
<td>-0.291</td>
<td>-0.286</td>
<td>-0.280</td>
</tr>
<tr>
<td>1</td>
<td>0.082</td>
<td>0.086</td>
<td>0.091</td>
<td>1</td>
<td>0.105</td>
<td>0.112</td>
<td>0.117</td>
</tr>
<tr>
<td>2</td>
<td>-0.034</td>
<td>-0.035</td>
<td>-0.037</td>
<td>2</td>
<td>-0.044</td>
<td>-0.046</td>
<td>-0.048</td>
</tr>
<tr>
<td>3</td>
<td>-0.024</td>
<td>-0.025</td>
<td>-0.027</td>
<td>3</td>
<td>-0.039</td>
<td>-0.042</td>
<td>-0.046</td>
</tr>
<tr>
<td>4</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>4</td>
<td>-0.009</td>
<td>-0.009</td>
<td>-0.010</td>
</tr>
<tr>
<td>5</td>
<td>0.004</td>
<td>0.004</td>
<td>0.005</td>
<td>5</td>
<td>0.008</td>
<td>0.008</td>
<td>0.009</td>
</tr>
<tr>
<td>6</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>6</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
</tr>
<tr>
<td>7</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>7</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>8</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>8</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$\nu$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.310</td>
<td>-0.325</td>
<td>-0.330</td>
<td>0</td>
<td>-0.340</td>
<td>-0.347</td>
<td>-0.353</td>
</tr>
<tr>
<td>1</td>
<td>0.127</td>
<td>0.135</td>
<td>0.142</td>
<td>1</td>
<td>0.144</td>
<td>0.153</td>
<td>0.162</td>
</tr>
<tr>
<td>2</td>
<td>-0.054</td>
<td>-0.058</td>
<td>-0.061</td>
<td>2</td>
<td>-0.066</td>
<td>-0.070</td>
<td>-0.074</td>
</tr>
<tr>
<td>3</td>
<td>-0.050</td>
<td>-0.053</td>
<td>-0.056</td>
<td>3</td>
<td>-0.080</td>
<td>-0.087</td>
<td>-0.094</td>
</tr>
<tr>
<td>4</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.019</td>
<td>4</td>
<td>-0.026</td>
<td>-0.028</td>
<td>-0.033</td>
</tr>
<tr>
<td>5</td>
<td>0.015</td>
<td>0.014</td>
<td>0.015</td>
<td>5</td>
<td>0.020</td>
<td>0.022</td>
<td>0.024</td>
</tr>
<tr>
<td>6</td>
<td>0.016</td>
<td>0.017</td>
<td>0.019</td>
<td>6</td>
<td>0.030</td>
<td>0.032</td>
<td>0.035</td>
</tr>
<tr>
<td>7</td>
<td>0.007</td>
<td>0.006</td>
<td>0.006</td>
<td>7</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
</tr>
<tr>
<td>8</td>
<td>-0.000</td>
<td>-0.005</td>
<td>-0.006</td>
<td>8</td>
<td>-0.010</td>
<td>-0.010</td>
<td>-0.010</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>-0.007</td>
<td>-0.007</td>
<td>9</td>
<td>-0.015</td>
<td>-0.017</td>
<td>-0.019</td>
</tr>
<tr>
<td>10</td>
<td>-0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>10</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.007</td>
</tr>
<tr>
<td>11</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>11</td>
<td>0.006</td>
<td>0.006</td>
<td>0.007</td>
</tr>
<tr>
<td>12</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>12</td>
<td>0.009</td>
<td>0.010</td>
<td>0.011</td>
</tr>
</tbody>
</table>

$\nu = 0.992$
<table>
<thead>
<tr>
<th>η</th>
<th>x = 0.25</th>
<th>x = 0.50</th>
<th>x = 0.75</th>
<th>x = 0.25</th>
<th>x = 0.50</th>
<th>x = 0.75</th>
<th>x = 0.25</th>
<th>x = 0.50</th>
<th>x = 0.75</th>
<th>x = 0.25</th>
<th>x = 0.50</th>
<th>x = 0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.236</td>
<td>-0.407</td>
<td>-0.355</td>
<td>-0.193</td>
<td>-0.158</td>
<td>-0.152</td>
<td>-0.093</td>
<td>-0.080</td>
<td>-0.073</td>
<td>-0.041</td>
<td>-0.035</td>
<td>-0.030</td>
</tr>
<tr>
<td>1</td>
<td>-0.097</td>
<td>0.001</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
</tr>
<tr>
<td>2</td>
<td>-0.033</td>
<td>-0.038</td>
<td>-0.053</td>
<td>-0.044</td>
<td>-0.046</td>
<td>-0.060</td>
<td>-0.058</td>
<td>-0.058</td>
<td>-0.058</td>
<td>-0.058</td>
<td>-0.058</td>
<td>-0.058</td>
</tr>
<tr>
<td>3</td>
<td>-0.022</td>
<td>-0.025</td>
<td>-0.027</td>
<td>-0.014</td>
<td>-0.012</td>
<td>-0.009</td>
<td>-0.018</td>
<td>-0.018</td>
<td>-0.018</td>
<td>-0.018</td>
<td>-0.018</td>
<td>-0.018</td>
</tr>
<tr>
<td>4</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.018</td>
<td>-0.020</td>
<td>-0.020</td>
<td>-0.020</td>
<td>-0.020</td>
<td>-0.020</td>
</tr>
<tr>
<td>5</td>
<td>0.004</td>
<td>0.004</td>
<td>0.005</td>
<td>0.010</td>
<td>0.011</td>
<td>0.011</td>
<td>0.014</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
</tr>
<tr>
<td>6</td>
<td>0.002</td>
<td>0.003</td>
<td>0.000</td>
<td>0.010</td>
<td>0.012</td>
<td>0.013</td>
<td>0.018</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
</tr>
<tr>
<td>7</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
</tr>
<tr>
<td>8</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.006</td>
<td>-0.006</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.007</td>
<td>0.008</td>
<td>0.008</td>
<td>0.008</td>
<td>0.008</td>
<td>0.008</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
</tr>
</tbody>
</table>
### Table 6.8

**Two-Dimensional Clauser Coefficients of Propeller Induced Camber**

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\chi = 0.25$</th>
<th>$\chi = 0.50$</th>
<th>$\chi = 0.75$</th>
<th>$\chi = 0.25$</th>
<th>$\chi = 0.50$</th>
<th>$\chi = 0.75$</th>
<th>$\chi = 0.25$</th>
<th>$\chi = 0.50$</th>
<th>$\chi = 0.75$</th>
<th>$\chi = 0.25$</th>
<th>$\chi = 0.50$</th>
<th>$\chi = 0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.256</td>
<td>-0.261</td>
<td>-0.365</td>
<td>-0.190</td>
<td>-0.205</td>
<td>-0.196</td>
<td>-0.153</td>
<td>-0.154</td>
<td>-0.155</td>
<td>-0.206</td>
<td>-0.215</td>
<td>-0.218</td>
</tr>
<tr>
<td>1</td>
<td>0.096</td>
<td>0.086</td>
<td>0.091</td>
<td>0.102</td>
<td>0.106</td>
<td>0.109</td>
<td>0.102</td>
<td>0.105</td>
<td>0.106</td>
<td>0.104</td>
<td>0.110</td>
<td>0.115</td>
</tr>
<tr>
<td>2</td>
<td>-0.023</td>
<td>-0.028</td>
<td>-0.037</td>
<td>-0.042</td>
<td>-0.044</td>
<td>-0.046</td>
<td>-0.044</td>
<td>-0.046</td>
<td>-0.047</td>
<td>-0.047</td>
<td>-0.049</td>
<td>-0.051</td>
</tr>
<tr>
<td>3</td>
<td>-0.023</td>
<td>-0.025</td>
<td>-0.027</td>
<td>-0.047</td>
<td>-0.050</td>
<td>-0.054</td>
<td>-0.059</td>
<td>-0.063</td>
<td>-0.065</td>
<td>-0.058</td>
<td>-0.061</td>
<td>-0.064</td>
</tr>
<tr>
<td>4</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.006</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.018</td>
<td>-0.020</td>
<td>-0.022</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
</tr>
<tr>
<td>5</td>
<td>0.044</td>
<td>0.044</td>
<td>0.005</td>
<td>0.010</td>
<td>0.011</td>
<td>0.011</td>
<td>0.014</td>
<td>0.015</td>
<td>0.016</td>
<td>0.014</td>
<td>0.016</td>
<td>0.017</td>
</tr>
<tr>
<td>6</td>
<td>0.003</td>
<td>-0.003</td>
<td>-0.003</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
<td>0.018</td>
<td>0.020</td>
<td>0.021</td>
<td>0.016</td>
<td>0.018</td>
<td>0.020</td>
</tr>
<tr>
<td>7</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
<td>0.007</td>
<td>0.008</td>
<td>0.006</td>
<td>0.007</td>
<td>0.008</td>
</tr>
<tr>
<td>8</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.008</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
<td>0.008</td>
<td>0.009</td>
<td>0.010</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.003</td>
<td>0.004</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
</tr>
</tbody>
</table>
### Table 6.9
Two-Dimensional Glauert Coefficients of Propeller Induced Camber $e^*$ $\alpha$

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \nu )</td>
<td>( \chi = 0.25 )</td>
<td>( \chi = 0.50 )</td>
<td>( \chi = 0.75 )</td>
<td>( \chi = 0.25 )</td>
<td>( \chi = 0.50 )</td>
<td>( \chi = 0.75 )</td>
<td>( \chi = 0.25 )</td>
<td>( \chi = 0.50 )</td>
<td>( \chi = 0.75 )</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>0</td>
<td>0.219</td>
<td>0.245</td>
<td>0.289</td>
<td>0.229</td>
<td>0.240</td>
<td>0.231</td>
<td>0.177</td>
<td>0.177</td>
<td>0.177</td>
</tr>
<tr>
<td>1</td>
<td>0.105</td>
<td>0.115</td>
<td>0.124</td>
<td>0.121</td>
<td>0.122</td>
<td>0.123</td>
<td>0.125</td>
<td>0.121</td>
<td>0.125</td>
</tr>
<tr>
<td>2</td>
<td>0.037</td>
<td>0.041</td>
<td>0.046</td>
<td>0.054</td>
<td>0.060</td>
<td>0.065</td>
<td>0.062</td>
<td>0.067</td>
<td>0.071</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 6.10**

**Two-Dimensional Glauert Coefficients of Propeller Induced Camber**

\( \nu = 0.025 \)

<table>
<thead>
<tr>
<th>( \chi = 0.25 )</th>
<th>( \chi = 0.50 )</th>
<th>( \chi = 0.75 )</th>
<th>( \chi = 0.25 )</th>
<th>( \chi = 0.50 )</th>
<th>( \chi = 0.75 )</th>
<th>( \chi = 0.25 )</th>
<th>( \chi = 0.50 )</th>
<th>( \chi = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.337</td>
<td>0.342</td>
<td>0.350</td>
<td>0.273</td>
<td>0.241</td>
<td>0.242</td>
<td>0.184</td>
<td>0.184</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.124</td>
<td>0.128</td>
<td>0.134</td>
<td>0.126</td>
<td>0.129</td>
<td>0.132</td>
<td>0.134</td>
<td>0.134</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.051</td>
<td>0.057</td>
<td>0.063</td>
<td>0.064</td>
<td>0.071</td>
<td>0.077</td>
<td>0.079</td>
<td>0.076</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.026</td>
<td>0.030</td>
<td>0.034</td>
<td>0.026</td>
<td>0.029</td>
<td>0.032</td>
<td>0.030</td>
<td>0.034</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.018</td>
<td>0.020</td>
<td>0.023</td>
<td>0.026</td>
<td>0.029</td>
<td>0.032</td>
<td>0.030</td>
<td>0.034</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.012</td>
<td>0.013</td>
<td>0.014</td>
<td>0.017</td>
<td>0.019</td>
<td>0.021</td>
<td>0.020</td>
<td>0.023</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.009</td>
<td>0.010</td>
<td>0.012</td>
<td>0.015</td>
<td>0.017</td>
<td>0.018</td>
<td>0.018</td>
<td>0.020</td>
</tr>
</tbody>
</table>
### Table 6.11

**TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF PROPELLER INDUCED CAMBER \( \epsilon_{yh} \)**

<table>
<thead>
<tr>
<th>( \nu )</th>
<th>( \epsilon_{yh, 0.25} )</th>
<th>( \epsilon_{yh, 0.50} )</th>
<th>( \epsilon_{yh, 0.75} )</th>
<th>( \epsilon_{yh, 0.90} )</th>
<th>( \epsilon_{yh, 0.90, 0.75} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.320</td>
<td>-0.327</td>
<td>-0.332</td>
<td>-0.229</td>
<td>-0.230</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.107</td>
<td>-0.116</td>
<td>-0.124</td>
<td>-0.125</td>
<td>-0.126</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>7</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>9</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
TABLE 6.12
TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF PROPPELLER INDUCED CAMEB "T"  

<table>
<thead>
<tr>
<th>Φ (°/sec)</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.264</td>
<td>-0.268</td>
<td>-0.272</td>
<td>-0.195</td>
<td>-0.196</td>
<td>-0.197</td>
<td>-0.152</td>
<td>-0.152</td>
<td>-0.152</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.061</td>
<td>-0.066</td>
<td>-0.069</td>
<td>0.091</td>
<td>-0.095</td>
<td>-0.099</td>
<td>-0.099</td>
<td>-0.102</td>
<td>-0.102</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.011</td>
<td>0.015</td>
<td>0.016</td>
<td>0.033</td>
<td>0.035</td>
<td>0.037</td>
<td>0.043</td>
<td>0.045</td>
<td>0.047</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.015</td>
<td>-0.020</td>
<td>-0.022</td>
<td>-0.023</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.027</td>
<td>0.007</td>
<td>0.008</td>
<td>0.012</td>
<td>0.012</td>
<td>0.014</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.007</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
<td>0.005</td>
<td>0.005</td>
<td>0.006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Φ (°/sec)</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.322</td>
<td>-0.328</td>
<td>-0.333</td>
<td>-0.229</td>
<td>-0.231</td>
<td>-0.232</td>
<td>-0.177</td>
<td>-0.177</td>
<td>-0.177</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.110</td>
<td>-0.118</td>
<td>-0.126</td>
<td>-0.128</td>
<td>-0.131</td>
<td>-0.139</td>
<td>-0.128</td>
<td>-0.122</td>
<td>-0.126</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.040</td>
<td>0.043</td>
<td>0.047</td>
<td>0.057</td>
<td>0.062</td>
<td>0.066</td>
<td>0.065</td>
<td>0.069</td>
<td>0.072</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.018</td>
<td>-0.019</td>
<td>-0.021</td>
<td>-0.030</td>
<td>-0.033</td>
<td>-0.035</td>
<td>-0.037</td>
<td>-0.039</td>
<td>-0.042</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.011</td>
<td>0.011</td>
<td>0.013</td>
<td>0.020</td>
<td>0.022</td>
<td>0.024</td>
<td>0.026</td>
<td>0.028</td>
<td>0.030</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.005</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.019</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.004</td>
<td>0.005</td>
<td>0.005</td>
<td>0.010</td>
<td>0.011</td>
<td>0.012</td>
<td>0.014</td>
<td>0.015</td>
<td>0.017</td>
</tr>
</tbody>
</table>
**Table 6.13**

**TWO-DIMENSIONAL GLAUSLIT COEFFICIENTS OF PROPELLER INDUCED CAMBER $c_\tau$**

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\tau$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>( \nu = 0.25 )</td>
<td>( \nu = 0.25 )</td>
<td>( \nu = 0.25 )</td>
<td></td>
</tr>
<tr>
<td>( \nu = 0.50 )</td>
<td>( \nu = 0.50 )</td>
<td>( \nu = 0.50 )</td>
<td></td>
</tr>
<tr>
<td>( \nu = 0.75 )</td>
<td>( \nu = 0.75 )</td>
<td>( \nu = 0.75 )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.00 )</th>
<th>( \nu = 0.00 )</th>
<th>( \nu = 0.00 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.203</td>
<td>-0.208</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.060</td>
<td>-0.055</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.017</td>
<td>0.015</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.007</td>
<td>-0.006</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.323</td>
<td>-0.327</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.103</td>
<td>-0.117</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.038</td>
<td>0.042</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.017</td>
<td>-0.019</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.019</td>
<td>0.011</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.005</td>
<td>-0.006</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.40 )</th>
<th>( \nu = 0.40 )</th>
<th>( \nu = 0.40 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.295</td>
<td>-0.301</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.044</td>
<td>-0.039</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.024</td>
<td>0.027</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.008</td>
<td>-0.009</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.004</td>
<td>0.005</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.340</td>
<td>-0.347</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.120</td>
<td>-0.142</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.054</td>
<td>0.060</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.029</td>
<td>-0.033</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.020</td>
<td>0.022</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.003</td>
<td>-0.014</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.010</td>
<td>0.012</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.40 )</th>
<th>( \nu = 0.40 )</th>
<th>( \nu = 0.40 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.204</td>
<td>-0.215</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.109</td>
<td>-0.116</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.044</td>
<td>0.047</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.020</td>
<td>-0.022</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.012</td>
<td>0.013</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.006</td>
<td>-0.007</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
<th>( \nu = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.166</td>
<td>-0.169</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.114</td>
<td>-0.118</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.053</td>
<td>0.056</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.028</td>
<td>-0.031</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.018</td>
<td>0.020</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.010</td>
<td>-0.012</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.009</td>
<td>0.009</td>
</tr>
</tbody>
</table>
## Table 6.16

### Two-Dimensional Glauert Coefficients of Propeller Induced Camber $C_{p}$

<table>
<thead>
<tr>
<th>$\eta$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.960</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.294</td>
<td>-0.269</td>
<td>-0.272</td>
<td>-0.195</td>
<td>-0.196</td>
<td>-0.197</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.002</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.001</td>
<td>-0.006</td>
<td>-0.009</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.004</td>
<td>0.015</td>
<td>0.016</td>
<td>0.033</td>
<td>0.035</td>
<td>0.037</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.015</td>
<td>-0.014</td>
<td>-0.015</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.009</td>
<td>0.009</td>
<td>0.009</td>
</tr>
</tbody>
</table>

### Additional Data

- $e = 0.002$
- $N = 0.960$
- $\eta = 0.960$
<table>
<thead>
<tr>
<th>( \alpha )</th>
<th>( \beta = 0.25 )</th>
<th>( \beta = 0.50 )</th>
<th>( \beta = 0.75 )</th>
<th>( \alpha = 0.25 )</th>
<th>( \alpha = 0.50 )</th>
<th>( \alpha = 0.75 )</th>
<th>( \alpha = 0.25 )</th>
<th>( \alpha = 0.50 )</th>
<th>( \alpha = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta = 0.864 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.262</td>
<td>-0.266</td>
<td>-0.327</td>
<td>-0.235</td>
<td>-0.235</td>
<td>-0.235</td>
<td>-0.214</td>
<td>-0.235</td>
<td>-0.256</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.003</td>
<td>-0.005</td>
<td>-0.008</td>
<td>-0.010</td>
<td>-0.102</td>
<td>-0.105</td>
<td>-0.108</td>
<td>-0.115</td>
<td>-0.120</td>
</tr>
<tr>
<td>3</td>
<td>-0.006</td>
<td>-0.005</td>
<td>-0.008</td>
<td>-0.008</td>
<td>-0.009</td>
<td>-0.009</td>
<td>-0.009</td>
<td>-0.010</td>
<td>-0.010</td>
</tr>
<tr>
<td>4</td>
<td>0.013</td>
<td>0.015</td>
<td>0.032</td>
<td>0.033</td>
<td>0.037</td>
<td>0.042</td>
<td>0.045</td>
<td>0.047</td>
<td>0.047</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.001</td>
<td>-0.008</td>
<td>-0.010</td>
<td>-0.015</td>
<td>-0.022</td>
<td>-0.023</td>
<td>-0.024</td>
<td>-0.025</td>
<td>-0.026</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.002</td>
<td>0.002</td>
<td>0.007</td>
<td>0.007</td>
<td>0.008</td>
<td>0.012</td>
<td>0.013</td>
<td>0.014</td>
<td>0.014</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.007</td>
<td>-0.008</td>
<td>-0.009</td>
<td>-0.009</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

| \( \beta = 0.940 \) | | | | | | | | | |
| 0 | -0.294 | -0.301 | -0.305 | -0.214 | -0.235 | -0.236 | -0.216 | -0.235 | -0.256 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | -0.083 | -0.091 | -0.098 | -0.108 | -0.115 | -0.120 | -0.113 | -0.118 | -0.121 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.024 | 0.027 | 0.030 | 0.045 | 0.048 | 0.051 | 0.053 | 0.057 | 0.060 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | -0.008 | -0.009 | -0.010 | -0.020 | -0.022 | -0.025 | -0.027 | -0.029 | -0.033 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0.004 | 0.005 | 0.005 | 0.012 | 0.014 | 0.015 | 0.018 | 0.020 | 0.022 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0.001 | 0.001 | 0.002 | 0.006 | 0.007 | 0.008 | 0.010 | 0.012 | 0.013 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0.001 | 0.001 | 0.002 | 0.005 | 0.006 | 0.006 | 0.006 | 0.009 | 0.010 |

<p>| ( \beta = 0.970 ) | | | | | | | | | |
| 0 | -0.325 | -0.327 | -0.327 | -0.225 | -0.230 | -0.232 | -0.177 | -0.177 | -0.177 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | -0.101 | -0.117 | -0.126 | -0.125 | -0.133 | -0.139 | -0.126 | -0.131 | -0.135 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.033 | 0.043 | 0.047 | 0.056 | 0.061 | 0.066 | 0.063 | 0.068 | 0.072 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | -0.017 | -0.019 | -0.021 | -0.028 | -0.033 | -0.036 | -0.035 | -0.039 | -0.042 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0.010 | 0.012 | 0.013 | 0.020 | 0.022 | 0.024 | 0.025 | 0.028 | 0.031 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | -0.005 | -0.006 | -0.006 | -0.011 | -0.013 | -0.014 | -0.016 | -0.018 | -0.020 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0.004 | 0.005 | 0.005 | 0.010 | 0.011 | 0.012 | 0.013 | 0.015 | 0.017 |</p>
<table>
<thead>
<tr>
<th>$\lambda = 0.25$</th>
<th>$\lambda = 0.50$</th>
<th>$\lambda = 0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha = 0.900$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\lambda = 0.25$</td>
<td>$\lambda = 0.50$</td>
</tr>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.006</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>0.011</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.013</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.015</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.017</td>
<td>0.001</td>
</tr>
<tr>
<td>7</td>
<td>0.019</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>0.022</td>
<td>0.000</td>
</tr>
<tr>
<td>9</td>
<td>0.025</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>0.028</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0.031</td>
<td>0.000</td>
</tr>
<tr>
<td>12</td>
<td>0.034</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\lambda = 0.25$</th>
<th>$\lambda = 0.50$</th>
<th>$\lambda = 0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha = 0.944$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\lambda = 0.25$</td>
<td>$\lambda = 0.50$</td>
</tr>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.004</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.006</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>0.011</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.013</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.015</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.017</td>
<td>0.001</td>
</tr>
<tr>
<td>7</td>
<td>0.019</td>
<td>0.000</td>
</tr>
<tr>
<td>8</td>
<td>0.022</td>
<td>0.000</td>
</tr>
<tr>
<td>9</td>
<td>0.025</td>
<td>0.000</td>
</tr>
<tr>
<td>10</td>
<td>0.028</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0.031</td>
<td>0.000</td>
</tr>
<tr>
<td>12</td>
<td>0.034</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 6.17**

Two-Dimensional Glauert Coefficients of Propeller Induced Camber $e_\alpha$
### Table 6.18

**Two-Dimensional Glauert Coefficients of Propeller Induced Camber \( \gamma \)**

<table>
<thead>
<tr>
<th>( \mu )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.264</td>
<td>-0.269</td>
<td>-0.272</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.063</td>
<td>-0.067</td>
<td>-0.071</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.014</td>
<td>0.015</td>
<td>0.017</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.004</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \mu )</th>
<th>( \lambda = 0.90 )</th>
<th>( \lambda = 0.95 )</th>
<th>( \lambda = 0.97 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.323</td>
<td>-0.329</td>
<td>-0.334</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.118</td>
<td>-0.120</td>
<td>-0.128</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.041</td>
<td>0.044</td>
<td>0.048</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.018</td>
<td>-0.020</td>
<td>-0.022</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.011</td>
<td>0.012</td>
<td>0.013</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.005</td>
<td>-0.006</td>
<td>-0.006</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.004</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \mu )</th>
<th>( \lambda = 0.90 )</th>
<th>( \lambda = 0.95 )</th>
<th>( \lambda = 0.97 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.344</td>
<td>-0.351</td>
<td>-0.356</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-0.138</td>
<td>-0.148</td>
<td>-0.159</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.060</td>
<td>0.066</td>
<td>0.071</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>-0.033</td>
<td>-0.036</td>
<td>-0.040</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0.023</td>
<td>0.026</td>
<td>0.028</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>-0.015</td>
<td>-0.016</td>
<td>-0.019</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0.012</td>
<td>0.014</td>
<td>0.015</td>
</tr>
</tbody>
</table>
TABLES 7.1 - 7.3

ELEMENTS FOR CURVATURE CORRECTION OF TWO-DIMENSIONAL GLAUERT COEFFICIENTS OF EFFECTIVE SHROUD CAMBER DISTRIBUTION $O_k, l$

See Ref. 5, Section 1.3 and identify $O_k, l$ as the elements of the matrix $[1 + P + P^2 + P^3 + ...]$. These elements have been taken directly from Tables 1.1 - 1.3.

Accuracy: $\pm 0.0001$
**TABLE 7.2**

Elements for Curvature Correction of Two-Dimensional Glauert Coefficients of Effective Shroud Camber Distribution $O_{k,l}$

<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>1</td>
<td>0.1719</td>
<td>1.0000</td>
<td>0.0000</td>
<td>-0.0130</td>
<td>0</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0274</td>
<td>1.0000</td>
<td>0</td>
<td>-0.0042</td>
<td>0</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>3</td>
<td>-0.0009</td>
<td>-0.0046</td>
<td>0.0000</td>
<td>1.0000</td>
<td>0</td>
<td>-0.0020</td>
<td>0.0000</td>
</tr>
<tr>
<td>4</td>
<td>-0.0002</td>
<td>0</td>
<td>-0.0021</td>
<td>0</td>
<td>1.0000</td>
<td>0</td>
<td>-0.0012</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>-0.0012</td>
<td>0</td>
<td>1.0000</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0008</td>
<td>0</td>
<td>1.0013</td>
</tr>
</tbody>
</table>

**TABLE 7.3**

Elements for Curvature Correction of Two-Dimensional Glauert Coefficients of Effective Shroud Camber Distribution $O_{k,l}$

<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0077</td>
<td>0</td>
<td>0.0139</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>1</td>
<td>0.0558</td>
<td>1.0008</td>
<td>0.0000</td>
<td>-0.0031</td>
<td>0</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0063</td>
<td>1.0041</td>
<td>0</td>
<td>-0.0010</td>
<td>0</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>3</td>
<td>-0.0001</td>
<td>-0.0010</td>
<td>0.0000</td>
<td>1.0015</td>
<td>0</td>
<td>0.0000</td>
<td>-0.0005</td>
</tr>
<tr>
<td>4</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0005</td>
<td>0</td>
<td>1.0008</td>
<td>0</td>
<td>-0.0003</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>-0.0003</td>
<td>0</td>
<td>1.0005</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0002</td>
<td>0</td>
<td>1.0003</td>
</tr>
<tr>
<td>n</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>0</td>
<td>1.1398</td>
<td>0.0704</td>
<td>0</td>
<td>-0.0005</td>
<td>0</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.3186</td>
<td>1.1722</td>
<td>0.0197</td>
<td>-0.0329</td>
<td>-0.0001</td>
<td>0.0004</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0650</td>
<td>0</td>
<td>1.6425</td>
<td>0</td>
<td>-0.0101</td>
<td>0</td>
<td>0.0001</td>
</tr>
<tr>
<td>3</td>
<td>-0.0022</td>
<td>-0.0110</td>
<td>-0.0001</td>
<td>1.0147</td>
<td>0.0000</td>
<td>-0.0047</td>
<td>0.0000</td>
</tr>
<tr>
<td>4</td>
<td>-0.0008</td>
<td>0</td>
<td>-0.0051</td>
<td>0</td>
<td>1.0074</td>
<td>0</td>
<td>-0.0028</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0.0001</td>
<td>0.0000</td>
<td>-0.0028</td>
<td>0.0000</td>
<td>1.0045</td>
<td>0.0000</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0</td>
<td>0.0002</td>
<td>0</td>
<td>-0.0018</td>
<td>0</td>
<td>1.0031</td>
</tr>
</tbody>
</table>
TABLES 8.1 - 8.27

$\nu^{TH}$ TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT $c_{\Gamma', t_{\nu}}$
FOR $c_T = 1$ AND $\alpha_{\nu} = 1$

$$c_{\Gamma', t_{0}} = \frac{1}{2} \sqrt{\lambda} \int_{0}^{\pi} c_{\Gamma', (\phi)} \sqrt{1 + \cos \phi} \, d\phi$$

$$c_{\Gamma', t_{\nu}} = \frac{(-\lambda)^{\nu-1}}{2} \int_{0}^{\pi} c_{\Gamma', (\phi)} (\cos \phi)^{\nu-1} \sin \phi \, d\phi \quad , \quad \nu = 1, 2, \ldots 6$$

See coversheet of TABLES 11.1 - 11.18 for $c_{\Gamma', (x/c)}$ where $x/c \equiv -\frac{1}{2} \cos \phi$.

Accuracy: $\pm 0.001$
### Table 8.1

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.027</td>
<td>0.027</td>
<td>0.026</td>
<td>-0.009</td>
<td>-0.002</td>
<td>-0.004</td>
<td>-0.011</td>
<td>-0.012</td>
<td>-0.014</td>
<td>-0.007</td>
<td>-0.010</td>
<td>-0.012</td>
</tr>
<tr>
<td>1</td>
<td>0.057</td>
<td>0.059</td>
<td>0.062</td>
<td>0.054</td>
<td>0.055</td>
<td>0.056</td>
<td>0.045</td>
<td>0.046</td>
<td>0.046</td>
<td>0.061</td>
<td>0.062</td>
<td>0.063</td>
</tr>
<tr>
<td>2</td>
<td>0.019</td>
<td>0.019</td>
<td>0.010</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.006</td>
<td>0.006</td>
<td>0.027</td>
<td>0.022</td>
<td>0.023</td>
<td>0.024</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.009</td>
<td>0.010</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.011</td>
<td>0.009</td>
<td>0.005</td>
<td>-0.013</td>
<td>-0.017</td>
<td>-0.020</td>
<td>-0.020</td>
<td>-0.023</td>
<td>-0.025</td>
<td>-0.020</td>
<td>-0.023</td>
<td>-0.025</td>
</tr>
<tr>
<td>1</td>
<td>0.078</td>
<td>0.082</td>
<td>0.066</td>
<td>-0.006</td>
<td>0.068</td>
<td>0.069</td>
<td>0.054</td>
<td>0.054</td>
<td>0.055</td>
<td>0.054</td>
<td>0.054</td>
<td>0.055</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.015</td>
<td>0.015</td>
<td>0.025</td>
<td>0.025</td>
<td>0.027</td>
<td>0.032</td>
<td>0.033</td>
<td>0.034</td>
<td>0.032</td>
<td>0.033</td>
<td>0.034</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.003</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>
### Table 2.2

<table>
<thead>
<tr>
<th>( \nu )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.027</td>
<td>0.025</td>
<td>0.030</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.004</td>
<td>-0.011</td>
<td>-0.013</td>
<td>-0.014</td>
</tr>
<tr>
<td>1</td>
<td>0.058</td>
<td>0.060</td>
<td>0.062</td>
<td>0.054</td>
<td>0.055</td>
<td>0.056</td>
<td>0.046</td>
<td>0.046</td>
<td>0.048</td>
</tr>
<tr>
<td>2</td>
<td>0.019</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.025</td>
<td>0.025</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.009</td>
<td>0.009</td>
<td>0.010</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.009</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>( \nu = 0.50 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>0</td>
<td>0.021</td>
<td>0.020</td>
<td>0.018</td>
<td>-0.007</td>
<td>-0.010</td>
<td>-0.012</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
</tr>
<tr>
<td>1</td>
<td>0.060</td>
<td>0.072</td>
<td>0.075</td>
<td>0.061</td>
<td>0.062</td>
<td>0.063</td>
<td>0.050</td>
<td>0.051</td>
<td>0.051</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.012</td>
<td>0.013</td>
<td>0.022</td>
<td>0.023</td>
<td>0.024</td>
<td>0.029</td>
<td>0.030</td>
<td>0.031</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

### Table 2.3

<table>
<thead>
<tr>
<th>( \nu )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.010</td>
<td>0.008</td>
<td>0.005</td>
<td>-0.014</td>
<td>-0.017</td>
<td>-0.021</td>
</tr>
<tr>
<td>1</td>
<td>0.019</td>
<td>0.003</td>
<td>0.006</td>
<td>0.066</td>
<td>0.068</td>
<td>0.069</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.015</td>
<td>0.015</td>
<td>0.025</td>
<td>0.026</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 8.3**

$\nu^{th}$ term of propeller-shroud thickness contribution to shroud thrust coefficient $C_T$. 

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 8.4**

$\nu^{th}$ term of propeller-shroud thickness contribution to shroud thrust coefficient $C_T$.

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
### TABLE 6.4

<table>
<thead>
<tr>
<th>N</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.027</td>
<td>0.026</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.011</td>
<td>-0.013</td>
<td>-0.015</td>
<td>-0.007</td>
<td>-0.007</td>
<td>-0.007</td>
</tr>
<tr>
<td>1</td>
<td>0.057</td>
<td>0.060</td>
<td>0.054</td>
<td>0.055</td>
<td>0.056</td>
<td>0.045</td>
<td>0.046</td>
<td>0.046</td>
<td>0.046</td>
<td>0.044</td>
<td>0.044</td>
<td>0.044</td>
</tr>
<tr>
<td>2</td>
<td>0.100</td>
<td>0.101</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
<td>0.027</td>
<td>0.027</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.031</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### TABLE 6.5

<table>
<thead>
<tr>
<th>N</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
<th>( J = 0.25 )</th>
<th>( J = 0.50 )</th>
<th>( J = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.021</td>
<td>0.019</td>
<td>0.018</td>
<td>-0.007</td>
<td>-0.010</td>
<td>-0.012</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
<td>-0.007</td>
<td>-0.010</td>
<td>-0.012</td>
</tr>
<tr>
<td>1</td>
<td>0.069</td>
<td>0.072</td>
<td>0.075</td>
<td>0.004</td>
<td>0.002</td>
<td>0.004</td>
<td>0.050</td>
<td>0.051</td>
<td>0.051</td>
<td>0.050</td>
<td>0.051</td>
<td>0.051</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.012</td>
<td>0.013</td>
<td>0.022</td>
<td>0.023</td>
<td>0.024</td>
<td>0.029</td>
<td>0.030</td>
<td>0.031</td>
<td>0.029</td>
<td>0.030</td>
<td>0.031</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.025 0.027 0.026</td>
<td>-0.001 -0.004 -0.004</td>
<td>-0.011 -0.011 -0.014</td>
<td>0.020 0.019 0.018</td>
<td>-0.008 -0.010 -0.013</td>
<td>-0.016 -0.018 -0.020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.058 0.059 0.063</td>
<td>0.054 0.054 0.056</td>
<td>0.046 0.046 0.046</td>
<td>0.069 0.073 0.076</td>
<td>0.061 0.062 0.064</td>
<td>0.050 0.051 0.051</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.110 0.119 0.111</td>
<td>0.026 0.026 0.027</td>
<td>0.022 0.022 0.024</td>
<td>0.012 0.012 0.013</td>
<td>0.022 0.023 0.024</td>
<td>0.029 0.030 0.031</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.001 0.001 0.001</td>
<td>-0.001 -0.001 -0.001</td>
<td>0.000 0.000 0.000</td>
<td>0.001 0.001 0.001</td>
<td>0.000 0.000 0.000</td>
<td>-0.002 -0.002 -0.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td>0.000 0.000 0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>λ=0.25</td>
<td>λ=0.50</td>
<td>λ=0.75</td>
<td>λ=0.25</td>
<td>λ=0.50</td>
<td>λ=0.75</td>
<td>λ=0.25</td>
<td>λ=0.50</td>
<td>λ=0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.012</td>
<td>-0.013</td>
<td>-0.014</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.059</td>
<td>0.061</td>
<td>0.063</td>
<td>0.055</td>
<td>0.056</td>
<td>0.057</td>
<td>0.046</td>
<td>0.046</td>
<td>0.046</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
<td>0.027</td>
<td>0.027</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.010</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.020</td>
<td>0.019</td>
<td>0.017</td>
<td>-0.009</td>
<td>-0.011</td>
<td>-0.013</td>
<td>-0.017</td>
<td>-0.019</td>
<td>-0.020</td>
</tr>
<tr>
<td>1</td>
<td>0.010</td>
<td>0.013</td>
<td>0.010</td>
<td>0.061</td>
<td>0.063</td>
<td>0.064</td>
<td>0.059</td>
<td>0.051</td>
<td>0.051</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.013</td>
<td>0.013</td>
<td>0.023</td>
<td>0.023</td>
<td>0.024</td>
<td>0.020</td>
<td>0.030</td>
<td>0.031</td>
</tr>
<tr>
<td>3</td>
<td>0.011</td>
<td>0.001</td>
<td>0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.016</td>
<td>-0.019</td>
<td>-0.022</td>
</tr>
<tr>
<td>1</td>
<td>0.001</td>
<td>0.004</td>
<td>0.007</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.015</td>
<td>0.015</td>
<td>0.025</td>
<td>0.025</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>2</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
### Table 8.7

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.50 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.75 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.005</td>
<td>-0.011</td>
<td>-0.013</td>
<td>-0.014</td>
</tr>
<tr>
<td>1</td>
<td>0.057</td>
<td>0.061</td>
<td>0.063</td>
<td>0.034</td>
<td>0.055</td>
<td>0.056</td>
<td>0.045</td>
<td>0.046</td>
<td>0.046</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.029</td>
<td>0.025</td>
<td>0.026</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.009</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

### Table 8.7 (continued)

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.50 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.75 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.020</td>
<td>0.019</td>
<td>0.017</td>
<td>-0.007</td>
<td>-0.010</td>
<td>-0.013</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
</tr>
<tr>
<td>1</td>
<td>0.069</td>
<td>0.073</td>
<td>0.076</td>
<td>0.061</td>
<td>0.062</td>
<td>0.064</td>
<td>0.050</td>
<td>0.051</td>
<td>0.051</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.013</td>
<td>0.013</td>
<td>0.022</td>
<td>0.023</td>
<td>0.024</td>
<td>0.029</td>
<td>0.030</td>
<td>0.031</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
</tbody>
</table>

### Table 8.7 (continued)

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.50 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.75 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.010</td>
<td>0.007</td>
<td>0.003</td>
<td>-0.014</td>
<td>-0.018</td>
<td>-0.021</td>
<td>-0.020</td>
<td>-0.023</td>
<td>-0.025</td>
</tr>
<tr>
<td>1</td>
<td>0.029</td>
<td>0.033</td>
<td>0.035</td>
<td>0.026</td>
<td>0.068</td>
<td>0.069</td>
<td>0.054</td>
<td>0.054</td>
<td>0.055</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.016</td>
<td>0.016</td>
<td>0.025</td>
<td>0.026</td>
<td>0.027</td>
<td>0.032</td>
<td>0.033</td>
<td>0.034</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.004</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

### Table 8.7 (continued)

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.50 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>λ=0.75 J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.009</td>
<td>0.009</td>
<td>0.009</td>
<td>-0.008</td>
<td>-0.010</td>
<td>-0.012</td>
<td>-0.016</td>
<td>-0.018</td>
<td>-0.020</td>
</tr>
<tr>
<td>1</td>
<td>0.089</td>
<td>0.083</td>
<td>0.083</td>
<td>0.066</td>
<td>0.068</td>
<td>0.069</td>
<td>0.054</td>
<td>0.054</td>
<td>0.055</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.016</td>
<td>0.016</td>
<td>0.025</td>
<td>0.026</td>
<td>0.027</td>
<td>0.032</td>
<td>0.033</td>
<td>0.034</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.004</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>$\nu$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
<td>$\lambda=0.25$</td>
<td>$\lambda=0.50$</td>
<td>$\lambda=0.75$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.026</td>
<td>0.028</td>
<td>0.026</td>
<td>-0.001</td>
<td>-0.003</td>
<td>-0.005</td>
<td>-0.011</td>
<td>-0.013</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0.010</td>
<td>0.019</td>
<td>0.011</td>
<td>0.026</td>
<td>0.027</td>
<td>0.027</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>ν</td>
<td>λ=0.25</td>
<td>λ=0.50</td>
<td>λ=0.75</td>
<td>λ=0.25</td>
<td>λ=0.50</td>
<td>λ=0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.020</td>
<td>0.026</td>
<td>0.020</td>
<td>-0.002</td>
<td>-0.003</td>
<td>-0.005</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.059</td>
<td>0.061</td>
<td>0.063</td>
<td>0.055</td>
<td>0.056</td>
<td>0.057</td>
<td>0.046</td>
<td>0.046</td>
<td>0.047</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.020</td>
<td>0.020</td>
<td>0.021</td>
<td>0.026</td>
<td>0.027</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.010</td>
<td>0.018</td>
<td>0.017</td>
<td>-0.009</td>
<td>-0.011</td>
<td>-0.014</td>
</tr>
<tr>
<td>1</td>
<td>0.003</td>
<td>0.006</td>
<td>0.004</td>
<td>0.006</td>
<td>0.006</td>
<td>0.006</td>
</tr>
<tr>
<td>2</td>
<td>0.004</td>
<td>0.002</td>
<td>0.004</td>
<td>0.023</td>
<td>0.023</td>
<td>0.024</td>
</tr>
<tr>
<td>3</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ν</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.008</td>
<td>0.005</td>
<td>0.003</td>
<td>-0.016</td>
<td>-0.019</td>
<td>-0.022</td>
</tr>
<tr>
<td>1</td>
<td>0.001</td>
<td>0.004</td>
<td>0.008</td>
<td>0.007</td>
<td>0.006</td>
<td>0.007</td>
</tr>
<tr>
<td>2</td>
<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>( \lambda )</td>
<td>( \nu )</td>
<td>0.25</td>
<td>0.50</td>
<td>0.75</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-0.128</td>
<td>-0.135</td>
<td>-0.141</td>
<td>-0.093</td>
<td>-0.096</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.013</td>
<td>0.014</td>
<td>0.028</td>
<td>0.029</td>
<td>0.030</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**TABLE 8.10**

**TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT**

<table>
<thead>
<tr>
<th>( \lambda )</th>
<th>( \nu )</th>
<th>0.25</th>
<th>0.50</th>
<th>0.75</th>
<th>0.25</th>
<th>0.50</th>
<th>0.75</th>
<th>0.25</th>
<th>0.50</th>
<th>0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>-0.183</td>
<td>-0.195</td>
<td>-0.205</td>
<td>-0.117</td>
<td>-0.122</td>
<td>-0.124</td>
<td>-0.081</td>
<td>-0.082</td>
<td>-0.084</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.019</td>
<td>0.021</td>
<td>0.022</td>
<td>0.037</td>
<td>0.038</td>
<td>0.040</td>
<td>0.049</td>
<td>0.051</td>
<td>0.052</td>
<td>0.033</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.005</td>
<td>0.005</td>
<td>0.013</td>
<td>0.013</td>
<td>0.013</td>
<td>0.005</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \nu )</td>
<td>J0.25</td>
<td>J0.50</td>
<td>J0.75</td>
<td>J0.25</td>
<td>J0.50</td>
<td>J0.75</td>
<td>J0.25</td>
<td>J0.50</td>
<td>J0.75</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.129</td>
<td>-0.136</td>
<td>-0.142</td>
<td>-0.093</td>
<td>-0.096</td>
<td>-0.098</td>
<td>-0.067</td>
<td>-0.068</td>
<td>-0.069</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.014</td>
<td>0.014</td>
<td>0.028</td>
<td>0.029</td>
<td>0.030</td>
<td>0.059</td>
<td>0.040</td>
<td>0.041</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
<td>0.011</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>J0.25</td>
<td>J0.50</td>
</tr>
<tr>
<td>0</td>
<td>-0.159</td>
<td>-0.168</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.016</td>
<td>0.017</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>J0.25</td>
<td>J0.50</td>
</tr>
<tr>
<td>0</td>
<td>-0.185</td>
<td>-0.196</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.019</td>
<td>0.021</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>( \nu )</td>
<td>( J = 0.25 )</td>
<td>( J = 0.50 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.182</td>
<td>-0.198</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.021</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>( \nu )</td>
<td>J=0.25</td>
<td>J=0.50</td>
</tr>
<tr>
<td>0</td>
<td>-0.138</td>
<td>-0.136</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.014</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| \( \lambda = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) | \( \nu \) | J=0.25 | J=0.50 | J=0.75 | J=0.25 | J=0.50 | J=0.75 | J=0.25 | J=0.50 | J=0.75 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.184 | -0.196 | -0.206 | -0.117 | -0.121 | -0.124 | -0.008 | -0.008 | -0.008 | -0.158 | -0.166 | -0.176 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0.019 | 0.021 | 0.022 | 0.037 | 0.039 | 0.040 | 0.049 | 0.051 | 0.052 | 0.015 | 0.017 | 0.018 | 2 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.001 | 0.001 | 0.001 | 0.004 | 0.005 | 0.005 | 0.013 | 0.013 | 0.013 | 0.001 | 0.001 | 0.001 | 4 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.005 | 0.005 | 0.005 | 0.000 | 0.000 | 0.000 | 6 | 0 | 0 |
### Table 8.14

**\( V \)th Term of Propeller-Shroud Thickness Contribution to Shroud Thrust Coefficient** \( C_{\tau, V} \)

<table>
<thead>
<tr>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( J=0.25 )</td>
<td>( J=0.50 )</td>
<td>( J=0.75 )</td>
<td>( J=0.25 )</td>
<td>( J=0.50 )</td>
</tr>
<tr>
<td>0</td>
<td>(-0.250)</td>
<td>(-0.259)</td>
<td>(-0.286)</td>
<td>(-0.159)</td>
<td>(-0.168)</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.013</td>
<td>0.014</td>
<td>0.016</td>
<td>0.017</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### Table 8.14 (continued)

<table>
<thead>
<tr>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( J=0.25 )</td>
<td>( J=0.50 )</td>
<td>( J=0.75 )</td>
<td>( J=0.25 )</td>
<td>( J=0.50 )</td>
</tr>
<tr>
<td>0</td>
<td>(-0.186)</td>
<td>(-0.197)</td>
<td>(-0.206)</td>
<td>(-0.118)</td>
<td>(-0.121)</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.021</td>
<td>0.022</td>
<td>0.027</td>
<td>0.029</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

### Table 8.14 (continued)

<table>
<thead>
<tr>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( J=0.25 )</td>
<td>( J=0.50 )</td>
<td>( J=0.75 )</td>
<td>( J=0.25 )</td>
</tr>
<tr>
<td>0</td>
<td>(-0.118)</td>
<td>(-0.121)</td>
<td>(-0.124)</td>
<td>(-0.012)</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.007</td>
<td>0.009</td>
<td>0.010</td>
<td>0.049</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.013</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \mu = 0.900 )</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>( \nu = 0.25 )</td>
<td>( \nu = 0.50 )</td>
<td>( \nu = 0.75 )</td>
<td>( \nu = 0.25 )</td>
<td>( \nu = 0.50 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.132</td>
<td>-0.138</td>
<td>-0.143</td>
<td>-0.094</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.014</td>
<td>0.014</td>
<td>0.029</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \mu = 0.970 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu = 0.25 )</td>
<td>( \nu = 0.50 )</td>
<td>( \nu = 0.75 )</td>
<td>( \nu = 0.25 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.189</td>
<td>-0.199</td>
<td>-0.208</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.021</td>
<td>0.022</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
TABLE 8.19

$\nu^TH$ TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT $C_{p_{1h}}$

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.129 -0.137 -0.143</td>
<td>-0.093 -0.096 -0.098</td>
<td>-0.067 -0.069 -0.069</td>
<td>0</td>
<td>-0.158 -0.169 -0.177</td>
<td>-0.106 -0.110 -0.113</td>
<td>-0.075 -0.077 -0.078</td>
</tr>
<tr>
<td>1</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>1</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>2</td>
<td>0.013 0.014 0.014</td>
<td>0.028 0.039 0.030</td>
<td>0.039 0.040 0.041</td>
<td>2</td>
<td>0.016 0.017 0.018</td>
<td>0.033 0.034 0.035</td>
<td>0.045 0.046 0.047</td>
</tr>
<tr>
<td>3</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>3</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>4</td>
<td>0.001 0.001 0.001</td>
<td>0.004 0.004 0.004</td>
<td>0.011 0.011 0.011</td>
<td>4</td>
<td>0.001 0.001 0.001</td>
<td>0.004 0.004 0.004</td>
<td>0.012 0.012 0.012</td>
</tr>
<tr>
<td>5</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>5</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>6</td>
<td>0.000 0.000 0.000</td>
<td>0.001 0.001 0.001</td>
<td>0.004 0.004 0.004</td>
<td>6</td>
<td>0.000 0.000 0.000</td>
<td>0.001 0.001 0.001</td>
<td>0.004 0.004 0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.185 -0.197 -0.207</td>
<td>-0.117 -0.121 -0.125</td>
<td>-0.081 -0.082 -0.084</td>
<td>0</td>
<td>-0.185 -0.197 -0.207</td>
<td>-0.117 -0.121 -0.125</td>
<td>-0.081 -0.082 -0.084</td>
</tr>
<tr>
<td>1</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>1</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>2</td>
<td>0.019 0.021 0.022</td>
<td>0.037 0.039 0.040</td>
<td>0.049 0.051 0.052</td>
<td>2</td>
<td>0.019 0.021 0.022</td>
<td>0.037 0.039 0.040</td>
<td>0.049 0.051 0.052</td>
</tr>
<tr>
<td>3</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>3</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>4</td>
<td>0.001 0.001 0.001</td>
<td>0.005 0.005 0.005</td>
<td>0.013 0.013 0.013</td>
<td>4</td>
<td>0.001 0.001 0.001</td>
<td>0.005 0.005 0.005</td>
<td>0.013 0.013 0.013</td>
</tr>
<tr>
<td>5</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>5</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
<tr>
<td>6</td>
<td>0.000 0.000 0.000</td>
<td>0.001 0.001 0.001</td>
<td>0.005 0.005 0.005</td>
<td>6</td>
<td>0.000 0.000 0.000</td>
<td>0.001 0.001 0.001</td>
<td>0.005 0.005 0.005</td>
</tr>
<tr>
<td>( \nu )</td>
<td>( \lambda \leq 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \nu )</td>
<td>( \lambda \leq 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>0</td>
<td>-0.110</td>
<td>-0.137</td>
<td>-0.143</td>
<td>-0.093</td>
<td>-0.096</td>
<td>-0.098</td>
<td>-0.097</td>
</tr>
<tr>
<td>1</td>
<td>0.013</td>
<td>0.014</td>
<td>0.014</td>
<td>0.023</td>
<td>0.029</td>
<td>0.030</td>
<td>0.040</td>
</tr>
<tr>
<td>2</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.010</td>
<td>0.009</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 8.17**

\( \gamma \) th term of propeller-shroud thickness contribution to shroud thrust coefficient \( C_{\gamma \nu} \).
<table>
<thead>
<tr>
<th>$N=6$</th>
<th>$T=0.008$</th>
<th>$x=0.994$</th>
</tr>
</thead>
</table>

### Table 8.18

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\mu=0.000$</td>
<td>$j=0.25$</td>
<td>$j=0.50$</td>
<td>$j=0.75$</td>
</tr>
<tr>
<td>0</td>
<td>-0.132</td>
<td>-0.129</td>
<td>-0.144</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.013</td>
<td>0.014</td>
<td>0.014</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

| $\mu=0.940$ | $j=0.25$ | $j=0.50$ | $j=0.75$ | $j=0.25$ | $j=0.50$ | $j=0.75$ | $j=0.25$ | $j=0.50$ | $j=0.75$ |
|-------|----------------|----------------|----------------|
| 0 | -0.163 | -0.171 | -0.179 | -0.108 | -0.111 | -0.113 | -0.076 | -0.077 | -0.078 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0.017 | 0.018 | 0.018 | 0.033 | 0.035 | 0.036 | 0.045 | 0.046 | 0.046 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.001 | 0.001 | 0.001 | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.004 | 0.004 | 0.004 |

| $\mu=0.970$ | $j=0.25$ | $j=0.50$ | $j=0.75$ | $j=0.25$ | $j=0.50$ | $j=0.75$ |
|-------|----------------|----------------|----------------|
| 0 | -0.190 | -0.200 | -0.209 | -0.119 | -0.122 | -0.125 | -0.082 | -0.084 | -0.085 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0.020 | 0.021 | 0.022 | 0.028 | 0.029 | 0.040 | 0.050 | 0.052 | 0.053 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.001 | 0.001 | 0.001 | 0.005 | 0.005 | 0.005 | 0.013 | 0.013 | 0.013 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.005 | 0.005 | 0.005 |
### Table 8.10

**10**

<table>
<thead>
<tr>
<th>$e = 0.990$</th>
<th>$e = 0.990$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x = 0.25$</td>
<td>$x = 0.50$</td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\lambda = 0.25$</td>
</tr>
<tr>
<td>$\nu$</td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td>1</td>
<td>-0.001</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Legend:**
- $\nu$: Function parameter
- $\lambda$: Dimensionless parameter
- $e$: Propeller-shroud thickness contribution to shroud thrust coefficient $C_{f_{\lambda}}$
<table>
<thead>
<tr>
<th>( e )</th>
<th>( N )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.23t</td>
<td>-0.245</td>
<td>-0.237</td>
<td>-0.155</td>
</tr>
<tr>
<td>1</td>
<td>-0.056</td>
<td>-0.060</td>
<td>-0.062</td>
<td>-0.054</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**TABLE 8.20**

\( c_{TH} \) TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT \( c_{TH} \)
### Table 8.21

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J=0.00</td>
<td>J=0.05</td>
<td>J=0.10</td>
<td>J=0.15</td>
<td>J=0.00</td>
<td>J=0.05</td>
<td>J=0.10</td>
<td>J=0.15</td>
<td>J=0.00</td>
</tr>
<tr>
<td>0</td>
<td>-0.242</td>
<td>-0.251</td>
<td>-0.258</td>
<td>-0.151</td>
<td>-0.153</td>
<td>-0.155</td>
<td>-0.100</td>
<td>-0.101</td>
<td>-0.101</td>
</tr>
<tr>
<td>1</td>
<td>-0.053</td>
<td>-0.061</td>
<td>-0.063</td>
<td>-0.054</td>
<td>-0.056</td>
<td>-0.057</td>
<td>-0.046</td>
<td>-0.046</td>
<td>-0.046</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
<td>0.027</td>
<td>0.027</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.003</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
<td>0.010</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>0.003</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Notes:**
- $\nu$ is the reduced frequency.
- $\lambda$ is the propeller diameter ratio.
- $\nu_0$ is the zeroth-order term.
- $\nu_1$ is the first-order term.
- $\nu_2$ is the second-order term.
- $\nu_3$ is the third-order term.
- $\nu_4$ is the fourth-order term.
- $\nu_5$ is the fifth-order term.
- $\nu_6$ is the sixth-order term.
<table>
<thead>
<tr>
<th>$\lambda$</th>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0</td>
<td>-0.327 -0.248 -0.257</td>
<td>-0.133 -0.153 -0.155</td>
<td>-0.100 -0.101 -0.101</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0.010</td>
<td>-0.051 -0.063</td>
<td>-0.051 -0.055 -0.056</td>
<td>-0.045 -0.045 -0.046</td>
<td>0.010</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
<td>0.026</td>
<td>0.027</td>
<td>0.012</td>
<td>0.013</td>
<td>0.011</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001 -0.001</td>
<td>-0.001 -0.001 -0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>( \nu )</td>
<td>( x = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( x = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( x = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( x = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.250</td>
<td>-0.350</td>
<td>-0.150</td>
<td>-0.100</td>
<td>-0.100</td>
<td>-0.100</td>
<td>-0.250</td>
<td>-0.350</td>
<td>-0.150</td>
<td>-0.100</td>
<td>-0.100</td>
<td>-0.100</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td>-0.555</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

**Table 8.23**

\( \nu \) th Term of Propeller-Shroud Thickness Contribution to Shroud Thrust Coefficient \( C_{T(r)} \)

---

\( \nu \) | \( x = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) | \( x = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) | \( x = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) | \( x = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
<td>-0.282</td>
</tr>
<tr>
<td>1</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
<td>-0.066</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
TABLE 2.2

\( v^{TH} \) TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT \( C_p \)

\[
\begin{array}{cccccccccccc}
\lambda &=& 0.25 & \lambda &=& 0.50 & \lambda &=& 0.75 & \lambda &=& 0.25 & \lambda &=& 0.50 & \lambda &=& 0.75 \\
\nu &=& 0 & 0.010 & 0.009 & 0.010 & 0.009 & 0.008 & 0.010 & 0.009 & 0.008 & 0.010 \\
& 0.010 & 0.009 & 0.010 & 0.009 & 0.008 & 0.010 & 0.009 & 0.008 & 0.010 \\
& 0.009 & 0.008 & 0.009 & 0.008 & 0.007 & 0.009 & 0.008 & 0.007 & 0.009 \\
& 0.008 & 0.007 & 0.008 & 0.007 & 0.006 & 0.008 & 0.007 & 0.006 & 0.008 \\
& 0.007 & 0.006 & 0.007 & 0.006 & 0.005 & 0.006 & 0.006 & 0.005 & 0.006 \\
& 0.006 & 0.005 & 0.006 & 0.005 & 0.004 & 0.005 & 0.005 & 0.004 & 0.005 \\
\end{array}
\]
<table>
<thead>
<tr>
<th>( \nu = 0.900 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.59 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \nu = 0.970 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.59 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \nu )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.238</td>
<td>-0.249</td>
<td>-0.258</td>
<td>-0.150</td>
<td>-0.153</td>
<td>-0.155</td>
<td>-0.100</td>
</tr>
<tr>
<td>1</td>
<td>-0.057</td>
<td>-0.061</td>
<td>-0.063</td>
<td>-0.054</td>
<td>-0.055</td>
<td>-0.056</td>
<td>-0.045</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.019</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.026</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
</tr>
<tr>
<td>( \nu = 0.050 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.281</td>
<td>-0.255</td>
<td>-0.206</td>
<td>-0.168</td>
<td>-0.173</td>
<td>-0.174</td>
<td>-0.119</td>
</tr>
<tr>
<td>1</td>
<td>-0.069</td>
<td>-0.073</td>
<td>-0.076</td>
<td>-0.061</td>
<td>-0.062</td>
<td>-0.064</td>
<td>-0.060</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.013</td>
<td>0.013</td>
<td>0.022</td>
<td>0.023</td>
<td>0.024</td>
<td>0.029</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.004</td>
<td>0.004</td>
<td>0.011</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>( \rho = 0.002 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
<td>( \rho = 0.002 )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>( \nu )</td>
<td>( J = 0, 0.25 )</td>
<td>( J = 0.50 )</td>
<td>( J = 0.75 )</td>
<td>( J = 0, 0.25 )</td>
<td>( J = 0.50 )</td>
<td>( J = 0.75 )</td>
<td>( J = 0, 0.25 )</td>
</tr>
<tr>
<td>0</td>
<td>-0.240</td>
<td>-0.250</td>
<td>-0.259</td>
<td>-0.150</td>
<td>-0.152</td>
<td>-0.155</td>
<td>-0.100</td>
</tr>
<tr>
<td>1</td>
<td>-0.058</td>
<td>-0.061</td>
<td>-0.063</td>
<td>-0.054</td>
<td>-0.056</td>
<td>-0.057</td>
<td>-0.046</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.025</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.009</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
</tr>
</tbody>
</table>

**TABLE 8.25**

**\( \nu \)TH TERM OF PROPELLER-SHROUD THICKNESS CONTRIBUTION TO SHROUD THRUST COEFFICIENT \( C_{\nu T} \)**

*Note: Data values are given for different values of \( \rho \) and \( \lambda \).*
<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\theta=0.900$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>-0.324</td>
<td>-0.338</td>
<td>-0.359</td>
<td>-0.359</td>
</tr>
<tr>
<td>1</td>
<td>-0.081</td>
<td>-0.084</td>
<td>-0.088</td>
<td>-0.088</td>
</tr>
<tr>
<td>2</td>
<td>0.014</td>
<td>0.015</td>
<td>0.016</td>
<td>0.016</td>
</tr>
<tr>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0$</td>
<td>-0.243</td>
<td>-0.252</td>
<td>-0.260</td>
<td>-0.260</td>
</tr>
<tr>
<td>1</td>
<td>-0.059</td>
<td>-0.061</td>
<td>-0.063</td>
<td>-0.063</td>
</tr>
<tr>
<td>2</td>
<td>0.010</td>
<td>0.010</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$\nu$</th>
<th>$\lambda=0.25$</th>
<th>$\lambda=0.50$</th>
<th>$\lambda=0.75$</th>
<th>$\lambda=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0$</td>
<td>-0.287</td>
<td>-0.299</td>
<td>-0.300</td>
<td>-0.300</td>
</tr>
<tr>
<td>1</td>
<td>-0.071</td>
<td>-0.074</td>
<td>-0.076</td>
<td>-0.076</td>
</tr>
<tr>
<td>2</td>
<td>0.012</td>
<td>0.013</td>
<td>0.013</td>
<td>0.013</td>
</tr>
<tr>
<td>3</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>4</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
TABLES 9.1 - 9.3

ELEMENTS FOR SHROUD CURVATURE CONTRIBUTION TO SHROUD SURFACE PRESSURE ARISING FROM EFFECTIVE SHROUD CAMBER $S_{k,l}$

See Ref. 5, Section 3.4. These elements have been taken directly from Tables 3.12 - 3.14.

Accuracy: ± 0.0001
### Table 9.2
Elements for Shroud Curvature Contribution to Shroud Surface Pressure Arising from Effective Shroud Camber \( \beta_{r1} \)

<table>
<thead>
<tr>
<th>k</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.2088</td>
<td>0.6058</td>
<td>0</td>
<td>-0.0014</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-0.5177</td>
<td>0</td>
<td>-0.2599</td>
<td>0</td>
<td>0.0011</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0021</td>
<td>0.1200</td>
<td>0</td>
<td>-0.1274</td>
<td>0</td>
<td>0.0003</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.0000</td>
<td>-0.0003</td>
<td>0.0049</td>
<td>0</td>
<td>-0.0484</td>
<td>0</td>
<td>0.0001</td>
</tr>
<tr>
<td>4</td>
<td>0.0000</td>
<td>-0.0003</td>
<td>0.0050</td>
<td>0</td>
<td>-0.0628</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0001</td>
<td>0.0050</td>
<td>0</td>
<td>-0.0001</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0001</td>
<td>0</td>
<td>0.0418</td>
<td>0</td>
</tr>
</tbody>
</table>

### Table 9.1
Elements for Shroud Curvature Contribution to Shroud Surface Pressure Arising from Effective Shroud Camber \( \beta_{r1} \)

<table>
<thead>
<tr>
<th>k</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.7845</td>
<td>0.3827</td>
<td>0</td>
<td>-0.0005</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-0.2544</td>
<td>0</td>
<td>-0.1273</td>
<td>0</td>
<td>0.0001</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0018</td>
<td>0.0037</td>
<td>0</td>
<td>-0.0003</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.0003</td>
<td>0</td>
<td>0.0019</td>
<td>0</td>
<td>-0.0017</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>4</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0013</td>
<td>0</td>
<td>-0.0013</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0150</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0208</td>
<td>0</td>
</tr>
</tbody>
</table>
TABLE 9.3
ELEMENTS FOR SHROUD CURVATURE CONTRIBUTION TO SHROUD SURFACE PRESSURE
ARISING FROM EFFECTIVE SHROUD CAMBER $S_{n,t}$

<table>
<thead>
<tr>
<th>$k$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.4971</td>
<td>0.7496</td>
<td>0</td>
<td>-0.0009</td>
<td>0</td>
<td>-0.0001</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>-0.7737</td>
<td>0</td>
<td>-0.3919</td>
<td>0</td>
<td>0.0021</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>0.0049</td>
<td>0.1959</td>
<td>0</td>
<td>-0.1950</td>
<td>0</td>
<td>0.0010</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.0061</td>
<td>0</td>
<td>0.1300</td>
<td>0</td>
<td>-0.1273</td>
<td>0</td>
<td>0.0004</td>
</tr>
<tr>
<td>4</td>
<td>0.0065</td>
<td>-0.0008</td>
<td>0</td>
<td>0.0055</td>
<td>0</td>
<td>-0.0047</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0004</td>
<td>0</td>
<td>0.0057</td>
<td>0</td>
<td>-0.0055</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>-0.0002</td>
<td>0</td>
<td>0.0029</td>
<td>0</td>
</tr>
</tbody>
</table>
TABLES 10.1 - 10.3

ELEMENTS FOR SHROUD CURVATURE CONTRIBUTION TO SHROUD SURFACE PRESSURE ARISING FROM SHROUD THICKNESS $T_{k,l}$

See Ref. 5, Section 3.3. These elements have been taken directly from Tables 3.7 - 3.9.

Accuracy: $\pm 0.0001$
<table>
<thead>
<tr>
<th>#</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0224</td>
<td>0</td>
<td>-0.0056</td>
<td>0</td>
<td>-0.0008</td>
<td>0</td>
<td>-0.0002</td>
</tr>
<tr>
<td>1</td>
<td>0.0702</td>
<td>0.0408</td>
<td>0</td>
<td>0.0024</td>
<td>0</td>
<td>0.0003</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.0140</td>
<td>0</td>
<td>-0.0016</td>
<td>0</td>
<td>-0.0006</td>
<td>0</td>
<td>-0.0001</td>
</tr>
<tr>
<td>3</td>
<td>-0.0009</td>
<td>-0.0022</td>
<td>0</td>
<td>0.0002</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>-0.0001</td>
<td>0</td>
<td>-0.0001</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**TABLE 10.1**

ELEMENTS FOR SHROUD CURVATURE CONTRIBUTION TO SHROUD SURFACE PRESSURE ARISING FROM SHROUD THICKNESS $T_{h,i}$

<table>
<thead>
<tr>
<th>#</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.0150</td>
<td>0</td>
<td>-0.0013</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>1</td>
<td>0.0467</td>
<td>0.0177</td>
<td>0</td>
<td>0.0003</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.0048</td>
<td>0</td>
<td>-0.0004</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>3</td>
<td>-0.0003</td>
<td>-0.0005</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.0001</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>5</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0.0001</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
<td>0</td>
<td>0.0000</td>
</tr>
<tr>
<td>K</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>0</td>
<td>0.628</td>
<td>-0.004</td>
<td></td>
<td>-0.003</td>
<td>0</td>
<td>0.002</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.055</td>
<td>0.060</td>
<td>-0.015</td>
<td>0</td>
<td>0.004</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>-0.002</td>
<td>0</td>
<td>-0.003</td>
<td>0</td>
<td>0</td>
<td>0.001</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\( \lambda = 0.75 \)
TABLES 11.1 - 11.18

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT \( c_{\Gamma'} \), \((x/c)\)
FOR \( C_T = 1 \)

\[
c_{\Gamma'} \left( \frac{x}{c} \right) = \lambda \left( \frac{x}{c} - \lambda \right) \frac{N \mu}{R U} \int_0^{\pi/2} \frac{\Gamma(\beta)}{\sqrt{\mu \cos \beta}} \sin \beta \left[ \omega Q_{-\frac{1}{2}}(\omega) - Q_{\frac{1}{2}}(\omega) \right] \, d\beta
\]

\[
\omega = 1 + \frac{\lambda^2 \left( -2x/c + 2\lambda \right)^2 + (1 - \mu \cos \beta)^2}{2\mu \cos \beta}
\]

Accuracy: \( \pm 0.001 \)

FOR \( x = 0.25 \), USE THE TABLES FOR \( x = -0.25 \) WITH EACH COLUMN INVERTED AND THE SIGN OF EACH NUMBER REVERSED.
### TABLE 11.2

**DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT \( c_p \) \((/c)\)**

<table>
<thead>
<tr>
<th>x/c</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \mu = 0.900 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.0060 -0.102 -0.102</td>
<td>-0.019 -0.122 -0.129</td>
<td>-0.118 -0.121 -0.124</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.0090 -0.074 -0.079</td>
<td>-0.010 -0.111 -0.116</td>
<td>-0.117 -0.122 -0.128</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.0260 -0.026 -0.030</td>
<td>-0.050 -0.054 -0.057</td>
<td>-0.069 -0.074 -0.079</td>
</tr>
<tr>
<td>-0.2</td>
<td>0.0260 0.026 0.030</td>
<td>0.050 0.054 0.057</td>
<td>0.069 0.074 0.079</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.0060 0.074 0.079</td>
<td>0.104 0.111 0.116</td>
<td>0.117 0.123 0.128</td>
</tr>
<tr>
<td>0</td>
<td>0.0080 0.022 0.023</td>
<td>0.110 0.122 0.129</td>
<td>0.118 0.121 0.124</td>
</tr>
<tr>
<td>0.1</td>
<td>0.110 0.117 0.122</td>
<td>0.119 0.123 0.125</td>
<td>0.108 0.110 0.111</td>
</tr>
<tr>
<td>0.2</td>
<td>0.117 0.123 0.128</td>
<td>0.113 0.116 0.118</td>
<td>0.096 0.097 0.097</td>
</tr>
<tr>
<td>0.3</td>
<td>0.120 0.125 0.129</td>
<td>0.106 0.107 0.109</td>
<td>0.085 0.085 0.085</td>
</tr>
<tr>
<td>0.4</td>
<td>0.119 0.124 0.127</td>
<td>0.098 0.099 0.100</td>
<td>0.075 0.075 0.075</td>
</tr>
<tr>
<td>0.5</td>
<td>0.118 0.121 0.124</td>
<td>0.090 0.091 0.091</td>
<td>0.066 0.066 0.066</td>
</tr>
<tr>
<td>( x )</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
</tr>
</tbody>
</table>

| \( \mu = 0.900 \) |                     |                      |                      |
| -0.5  | -0.127 -0.138 -0.144 | -0.141 -0.148 -0.154 | -0.134 -0.138 -0.142 |
| -0.4  | -0.101 -0.108 -0.116 | -0.134 -0.142 -0.150 | -0.141 -0.149 -0.155 |
| -0.3  | -0.043 -0.046 -0.050 | -0.077 -0.083 -0.089 | -0.101 -0.108 -0.116 |
| -0.2  | 0.043 0.046 0.050   | 0.077 0.083 0.089   | 0.101 0.108 0.116   |
| -0.1  | 0.101 0.108 0.116   | 0.124 0.124 0.110   | 0.141 0.149 0.155   |
| 0     | 0.127 0.136 0.144   | 0.141 0.148 0.154   | 0.134 0.138 0.142   |
| 0.1   | 0.138 0.146 0.154   | 0.136 0.141 0.145   | 0.120 0.122 0.124   |
| 0.2   | 0.141 0.149 0.155   | 0.137 0.130 0.133   | 0.105 0.106 0.107   |
| 0.3   | 0.141 0.147 0.152   | 0.117 0.119 0.121   | 0.093 0.093 0.093   |
| 0.4   | 0.138 0.143 0.147   | 0.108 0.109 0.110   | 0.081 0.081 0.081   |
| 0.5   | 0.134 0.138 0.142   | 0.099 0.099 0.100   | 0.072 0.072 0.071   |
| \( x \) | 0 0 0 | 0 0 0 | 0 0 0 |

| \( \mu = 0.900 \) |                     |                      |                      |
| -0.5  | -0.160 -0.168 -0.174 | 0.147 -0.152 -0.155 | -0.154 -0.161 -0.165 |
| -0.4  | -0.170 -0.172 -0.175 | -0.151 -0.170 -0.177 | -0.175 -0.185 -0.193 |
| -0.3  | -0.072 -0.079 -0.086 | -0.115 -0.125 -0.135 | -0.137 -0.149 -0.160 |
| -0.2  | 0.072 0.079 0.086   | 0.115 0.125 0.135   | 0.137 0.149 0.160   |
| -0.1  | 0.127 0.149 0.160   | 0.151 0.172 0.181   | 0.161 0.170 0.177   |
| 0     | 0.157 0.168 0.179   | 0.160 0.168 0.174   | 0.147 0.152 0.155   |
| 0.1   | 0.162 0.172 0.181   | 0.150 0.155 0.159   | 0.129 0.132 0.133   |
| 0.2   | 0.160 0.170 0.177   | 0.128 0.141 0.144   | 0.113 0.114 0.115   |
| 0.3   | 0.150 0.165 0.171   | 0.126 0.128 0.130   | 0.099 0.099 0.099   |
| 0.4   | 0.152 0.159 0.163   | 0.115 0.117 0.117   | 0.086 0.086 0.086   |
| 0.5   | 0.147 0.152 0.155   | 0.105 0.106 0.107   | 0.076 0.076 0.076   |
| \( x \) | 0 0 0 | 0 0 0 | 0 0 0 |
### Table 11.3

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient $C_T$, ($/c$)**

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$0.25$</th>
<th>$0.50$</th>
<th>$0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.0$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 11.4

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient $C_T$, ($/c$)**

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$0.25$</th>
<th>$0.50$</th>
<th>$0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.0$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 11.5

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient $C_T$, ($/c$)**

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$0.25$</th>
<th>$0.50$</th>
<th>$0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.0$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 11.6

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient $C_T$, ($/c$)**

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$0.25$</th>
<th>$0.50$</th>
<th>$0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.0$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 11.7

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient $C_T$, ($/c$)**

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$0.25$</th>
<th>$0.50$</th>
<th>$0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0.0$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \lambda / \xi )</td>
<td>( \lambda = 0.25 )</td>
<td>( \lambda = 0.50 )</td>
<td>( \lambda = 0.75 )</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>( \xi / \lambda )</td>
<td>( \xi = 0.25 )</td>
<td>( \xi = 0.50 )</td>
<td>( \xi = 0.75 )</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.095</td>
<td>-0.102</td>
<td>-0.108</td>
</tr>
<tr>
<td>0.4</td>
<td>-0.069</td>
<td>-0.074</td>
<td>-0.079</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.026</td>
<td>-0.028</td>
<td>-0.030</td>
</tr>
<tr>
<td>0.2</td>
<td>0.026</td>
<td>0.028</td>
<td>0.030</td>
</tr>
<tr>
<td>0.1</td>
<td>0.069</td>
<td>0.074</td>
<td>0.079</td>
</tr>
<tr>
<td>0</td>
<td>0.095</td>
<td>0.102</td>
<td>0.108</td>
</tr>
<tr>
<td>0.1</td>
<td>0.110</td>
<td>0.117</td>
<td>0.122</td>
</tr>
<tr>
<td>0.2</td>
<td>0.117</td>
<td>0.123</td>
<td>0.128</td>
</tr>
<tr>
<td>0.3</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
</tr>
<tr>
<td>0.4</td>
<td>0.119</td>
<td>0.124</td>
<td>0.127</td>
</tr>
<tr>
<td>0.5</td>
<td>0.117</td>
<td>0.121</td>
<td>0.124</td>
</tr>
</tbody>
</table>

| \( \xi / \lambda \) | \( \xi = 0.25 \) | \( \xi = 0.50 \) | \( \xi = 0.75 \) |
|----------------|----------------|----------------|
| \( \lambda / \xi \) | \( \lambda = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) |
| 0.5 | -0.136 | -0.140 | -0.142 |
| 0.4 | -0.132 | -0.136 | -0.138 |
| 0.3 | -0.072 | -0.079 | -0.087 |
| 0.2 | 0.071 | 0.079 | 0.087 |
| 0.1 | 0.135 | 0.140 | 0.146 |
| 0 | 0.155 | 0.160 | 0.166 |
| 0.1 | 0.161 | 0.172 | 0.182 |
| 0.2 | 0.160 | 0.170 | 0.178 |
| 0.3 | 0.157 | 0.165 | 0.171 |
| 0.4 | 0.152 | 0.158 | 0.163 |
| 0.5 | 0.146 | 0.152 | 0.155 |

| \( \xi / \lambda \) | \( \xi = 0.25 \) | \( \xi = 0.50 \) | \( \xi = 0.75 \) |
|----------------|----------------|----------------|
| \( \lambda / \xi \) | \( \lambda = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) |
| 0.5 | -0.055 | -0.060 | -0.063 |
| 0.4 | -0.052 | -0.054 | -0.058 |
| 0.3 | -0.029 | -0.030 | -0.031 |
| 0.2 | 0.016 | 0.018 | 0.021 |
| 0.1 | 0.041 | 0.043 | 0.047 |
| 0 | 0.071 | 0.074 | 0.077 |
| 0.1 | 0.100 | 0.103 | 0.107 |
| 0.2 | 0.123 | 0.127 | 0.131 |
| 0.3 | 0.140 | 0.142 | 0.146 |
| 0.4 | 0.147 | 0.149 | 0.153 |
| 0.5 | 0.150 | 0.154 | 0.158 |

| \( \xi / \lambda \) | \( \xi = 0.25 \) | \( \xi = 0.50 \) | \( \xi = 0.75 \) |
|----------------|----------------|----------------|
| \( \lambda / \xi \) | \( \lambda = 0.25 \) | \( \lambda = 0.50 \) | \( \lambda = 0.75 \) |
| 0.5 | -0.126 | -0.136 | -0.144 |
| 0.4 | -0.120 | -0.129 | -0.138 |
| 0.3 | -0.120 | -0.128 | -0.132 |
| 0.2 | -0.122 | -0.125 | -0.132 |
| 0.1 | -0.124 | -0.126 | -0.132 |
| 0 | -0.125 | -0.127 | -0.132 |
| 0.1 | -0.126 | -0.128 | -0.132 |
| 0.2 | -0.128 | -0.130 | -0.132 |
| 0.3 | -0.130 | -0.130 | -0.132 |
| 0.4 | -0.132 | -0.130 | -0.132 |
| 0.5 | -0.133 | -0.131 | -0.131 |

Note: The table represents the direct propeller contribution to shroud surface pressure coefficient \( \xi / \lambda \). The values are given in terms of \( \lambda / \xi \) for different values of \( \lambda / \xi \) and \( \xi / \lambda \). The entries show the pressure coefficient values for each combination of \( \lambda / \xi \) and \( \xi / \lambda \).
<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>1</td>
<td>0.000</td>
<td>0.010</td>
<td>0.016</td>
<td>0.000</td>
<td>0.010</td>
<td>0.016</td>
<td>0.000</td>
<td>0.010</td>
<td>0.016</td>
</tr>
<tr>
<td>0.1</td>
<td>0.100</td>
<td>0.110</td>
<td>0.120</td>
<td>0.090</td>
<td>0.100</td>
<td>0.110</td>
<td>0.080</td>
<td>0.090</td>
<td>0.100</td>
</tr>
<tr>
<td>0.2</td>
<td>0.200</td>
<td>0.210</td>
<td>0.220</td>
<td>0.180</td>
<td>0.200</td>
<td>0.210</td>
<td>0.160</td>
<td>0.180</td>
<td>0.200</td>
</tr>
<tr>
<td>0.3</td>
<td>0.300</td>
<td>0.310</td>
<td>0.320</td>
<td>0.280</td>
<td>0.300</td>
<td>0.310</td>
<td>0.260</td>
<td>0.280</td>
<td>0.300</td>
</tr>
<tr>
<td>0.4</td>
<td>0.400</td>
<td>0.410</td>
<td>0.420</td>
<td>0.380</td>
<td>0.400</td>
<td>0.410</td>
<td>0.360</td>
<td>0.380</td>
<td>0.400</td>
</tr>
<tr>
<td>0.5</td>
<td>0.500</td>
<td>0.510</td>
<td>0.520</td>
<td>0.480</td>
<td>0.500</td>
<td>0.510</td>
<td>0.460</td>
<td>0.480</td>
<td>0.500</td>
</tr>
</tbody>
</table>

**Table 11.5**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT \( c_{p} \) (x/c)
<table>
<thead>
<tr>
<th>x/c</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
</tr>
<tr>
<td>0.01</td>
<td>-0.099</td>
<td>-0.194</td>
<td>-0.109</td>
<td>-0.121</td>
<td>-0.126</td>
<td>-0.130</td>
<td>-0.119</td>
<td>-0.122</td>
<td>-0.125</td>
<td>-0.134</td>
<td>-0.139</td>
<td>-0.142</td>
</tr>
<tr>
<td>0.04</td>
<td>-0.072</td>
<td>-0.056</td>
<td>-0.000</td>
<td>-0.072</td>
<td>-0.056</td>
<td>-0.000</td>
<td>-0.072</td>
<td>-0.056</td>
<td>-0.000</td>
<td>-0.072</td>
<td>-0.056</td>
<td>-0.000</td>
</tr>
<tr>
<td>0.03</td>
<td>-0.027</td>
<td>-0.029</td>
<td>-0.031</td>
<td>-0.052</td>
<td>-0.055</td>
<td>-0.058</td>
<td>-0.072</td>
<td>-0.076</td>
<td>-0.090</td>
<td>-0.045</td>
<td>-0.048</td>
<td>-0.051</td>
</tr>
<tr>
<td>0.2</td>
<td>0.027</td>
<td>0.029</td>
<td>0.031</td>
<td>0.052</td>
<td>0.055</td>
<td>0.058</td>
<td>0.072</td>
<td>0.076</td>
<td>0.080</td>
<td>0.080</td>
<td>0.080</td>
<td>0.080</td>
</tr>
<tr>
<td>0.1</td>
<td>0.072</td>
<td>0.076</td>
<td>0.000</td>
<td>0.107</td>
<td>0.113</td>
<td>0.118</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
<td>0.120</td>
<td>0.125</td>
<td>0.129</td>
</tr>
<tr>
<td>0.1</td>
<td>0.099</td>
<td>0.104</td>
<td>0.109</td>
<td>0.121</td>
<td>0.125</td>
<td>0.130</td>
<td>0.119</td>
<td>0.122</td>
<td>0.125</td>
<td>0.135</td>
<td>0.139</td>
<td>0.142</td>
</tr>
<tr>
<td>0.1</td>
<td>0.113</td>
<td>0.119</td>
<td>0.124</td>
<td>0.120</td>
<td>0.124</td>
<td>0.127</td>
<td>0.108</td>
<td>0.110</td>
<td>0.111</td>
<td>0.120</td>
<td>0.122</td>
<td>0.124</td>
</tr>
<tr>
<td>0.1</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
<td>0.114</td>
<td>0.119</td>
<td>0.118</td>
<td>0.096</td>
<td>0.097</td>
<td>0.098</td>
<td>0.106</td>
<td>0.107</td>
<td>0.107</td>
</tr>
<tr>
<td>0.3</td>
<td>0.122</td>
<td>0.126</td>
<td>0.130</td>
<td>0.106</td>
<td>0.109</td>
<td>0.109</td>
<td>0.085</td>
<td>0.085</td>
<td>0.085</td>
<td>0.092</td>
<td>0.093</td>
<td>0.093</td>
</tr>
<tr>
<td>0.4</td>
<td>0.121</td>
<td>0.125</td>
<td>0.128</td>
<td>0.098</td>
<td>0.099</td>
<td>0.104</td>
<td>0.075</td>
<td>0.075</td>
<td>0.075</td>
<td>0.108</td>
<td>0.109</td>
<td>0.110</td>
</tr>
<tr>
<td>0.5</td>
<td>0.119</td>
<td>0.122</td>
<td>0.125</td>
<td>0.090</td>
<td>0.091</td>
<td>0.091</td>
<td>0.066</td>
<td>0.066</td>
<td>0.066</td>
<td>0.072</td>
<td>0.072</td>
<td>0.071</td>
</tr>
</tbody>
</table>

| x   | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |

<table>
<thead>
<tr>
<th>x/c</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
<td>0.025</td>
<td>0.050</td>
<td>0.075</td>
</tr>
<tr>
<td>0.01</td>
<td>-0.162</td>
<td>-0.172</td>
<td>-0.182</td>
<td>-0.163</td>
<td>-0.170</td>
<td>-0.176</td>
<td>-0.148</td>
<td>-0.153</td>
<td>-0.156</td>
<td>-0.189</td>
<td>-0.201</td>
<td>-0.213</td>
</tr>
<tr>
<td>0.04</td>
<td>-0.143</td>
<td>-0.154</td>
<td>-0.164</td>
<td>-0.165</td>
<td>-0.172</td>
<td>-0.184</td>
<td>-0.165</td>
<td>-0.172</td>
<td>-0.180</td>
<td>-0.189</td>
<td>-0.200</td>
<td>-0.209</td>
</tr>
<tr>
<td>0.03</td>
<td>-0.016</td>
<td>-0.082</td>
<td>-0.089</td>
<td>-0.120</td>
<td>-0.129</td>
<td>-0.139</td>
<td>-0.143</td>
<td>-0.154</td>
<td>-0.164</td>
<td>-0.134</td>
<td>-0.145</td>
<td>-0.159</td>
</tr>
<tr>
<td>0.2</td>
<td>0.016</td>
<td>0.082</td>
<td>0.089</td>
<td>0.120</td>
<td>0.129</td>
<td>0.139</td>
<td>0.143</td>
<td>0.154</td>
<td>0.164</td>
<td>0.134</td>
<td>0.145</td>
<td>0.159</td>
</tr>
<tr>
<td>0.1</td>
<td>0.143</td>
<td>0.154</td>
<td>0.164</td>
<td>0.165</td>
<td>0.175</td>
<td>0.184</td>
<td>0.165</td>
<td>0.173</td>
<td>0.180</td>
<td>0.189</td>
<td>0.200</td>
<td>0.210</td>
</tr>
<tr>
<td>0.1</td>
<td>0.165</td>
<td>0.175</td>
<td>0.184</td>
<td>0.163</td>
<td>0.170</td>
<td>0.176</td>
<td>0.148</td>
<td>0.153</td>
<td>0.156</td>
<td>0.189</td>
<td>0.201</td>
<td>0.213</td>
</tr>
<tr>
<td>0.1</td>
<td>0.165</td>
<td>0.173</td>
<td>0.180</td>
<td>0.129</td>
<td>0.142</td>
<td>0.145</td>
<td>0.113</td>
<td>0.114</td>
<td>0.115</td>
<td>0.185</td>
<td>0.197</td>
<td>0.207</td>
</tr>
<tr>
<td>0.2</td>
<td>0.160</td>
<td>0.167</td>
<td>0.172</td>
<td>0.127</td>
<td>0.129</td>
<td>0.130</td>
<td>0.099</td>
<td>0.099</td>
<td>0.099</td>
<td>0.181</td>
<td>0.195</td>
<td>0.209</td>
</tr>
<tr>
<td>0.4</td>
<td>0.154</td>
<td>0.160</td>
<td>0.164</td>
<td>0.115</td>
<td>0.117</td>
<td>0.118</td>
<td>0.066</td>
<td>0.066</td>
<td>0.066</td>
<td>0.189</td>
<td>0.201</td>
<td>0.213</td>
</tr>
<tr>
<td>0.5</td>
<td>0.148</td>
<td>0.153</td>
<td>0.156</td>
<td>0.106</td>
<td>0.106</td>
<td>0.107</td>
<td>0.076</td>
<td>0.076</td>
<td>0.076</td>
<td>0.189</td>
<td>0.197</td>
<td>0.207</td>
</tr>
</tbody>
</table>

<p>| x   | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |</p>
<table>
<thead>
<tr>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.25 )</th>
<th>( \lambda = 0.50 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.157</td>
<td>-0.159</td>
<td>-0.154</td>
<td>-0.180</td>
<td>-0.185</td>
<td>-0.188</td>
<td>-0.189</td>
<td>-0.185</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.133</td>
<td>-0.151</td>
<td>-0.160</td>
<td>-0.173</td>
<td>-0.171</td>
<td>-0.171</td>
<td>-0.171</td>
<td>-0.171</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.073</td>
<td>-0.081</td>
<td>-0.115</td>
<td>-0.120</td>
<td>-0.129</td>
<td>-0.128</td>
<td>-0.128</td>
<td>-0.128</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.031</td>
<td>-0.081</td>
<td>-0.115</td>
<td>-0.123</td>
<td>-0.139</td>
<td>-0.128</td>
<td>-0.128</td>
<td>-0.128</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.138</td>
<td>0.151</td>
<td>0.169</td>
<td>0.173</td>
<td>0.161</td>
<td>0.171</td>
<td>0.171</td>
<td>0.171</td>
</tr>
<tr>
<td>0.1</td>
<td>0.157</td>
<td>0.170</td>
<td>0.198</td>
<td>0.186</td>
<td>0.147</td>
<td>0.152</td>
<td>0.152</td>
<td>0.152</td>
</tr>
<tr>
<td>0.2</td>
<td>0.162</td>
<td>0.174</td>
<td>0.193</td>
<td>0.149</td>
<td>0.155</td>
<td>0.160</td>
<td>0.129</td>
<td>0.122</td>
</tr>
<tr>
<td>0.3</td>
<td>0.161</td>
<td>0.171</td>
<td>0.179</td>
<td>0.138</td>
<td>0.142</td>
<td>0.144</td>
<td>0.113</td>
<td>0.114</td>
</tr>
<tr>
<td>0.4</td>
<td>0.157</td>
<td>0.165</td>
<td>0.172</td>
<td>0.126</td>
<td>0.129</td>
<td>0.139</td>
<td>0.099</td>
<td>0.099</td>
</tr>
<tr>
<td>0.5</td>
<td>0.147</td>
<td>0.152</td>
<td>0.156</td>
<td>0.105</td>
<td>0.106</td>
<td>0.107</td>
<td>0.076</td>
<td>0.076</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.38 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.127</td>
<td>-0.137</td>
<td>-0.146</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.101</td>
<td>-0.110</td>
<td>-0.118</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.043</td>
<td>-0.047</td>
<td>-0.051</td>
</tr>
<tr>
<td>-0.2</td>
<td>0.043</td>
<td>0.047</td>
<td>0.051</td>
</tr>
<tr>
<td>0.1</td>
<td>0.101</td>
<td>0.110</td>
<td>0.118</td>
</tr>
<tr>
<td>0.2</td>
<td>0.127</td>
<td>0.137</td>
<td>0.146</td>
</tr>
<tr>
<td>0.3</td>
<td>0.038</td>
<td>0.043</td>
<td>0.051</td>
</tr>
<tr>
<td>0.4</td>
<td>0.038</td>
<td>0.043</td>
<td>0.051</td>
</tr>
<tr>
<td>0.5</td>
<td>0.038</td>
<td>0.043</td>
<td>0.051</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.40 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.127</td>
<td>-0.137</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.101</td>
<td>-0.110</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.043</td>
<td>-0.047</td>
</tr>
<tr>
<td>-0.2</td>
<td>0.043</td>
<td>0.047</td>
</tr>
<tr>
<td>0.1</td>
<td>0.101</td>
<td>0.110</td>
</tr>
<tr>
<td>0.2</td>
<td>0.127</td>
<td>0.137</td>
</tr>
<tr>
<td>0.3</td>
<td>0.038</td>
<td>0.043</td>
</tr>
<tr>
<td>0.4</td>
<td>0.038</td>
<td>0.043</td>
</tr>
<tr>
<td>0.5</td>
<td>0.038</td>
<td>0.043</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.97 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.185</td>
<td>-0.201</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.164</td>
<td>-0.189</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.135</td>
<td>-0.153</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.126</td>
<td>-0.153</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.177</td>
<td>0.196</td>
</tr>
<tr>
<td>0.1</td>
<td>0.185</td>
<td>0.201</td>
</tr>
<tr>
<td>0.2</td>
<td>0.183</td>
<td>0.197</td>
</tr>
<tr>
<td>0.3</td>
<td>0.177</td>
<td>0.191</td>
</tr>
<tr>
<td>0.4</td>
<td>0.164</td>
<td>0.172</td>
</tr>
<tr>
<td>0.5</td>
<td>0.157</td>
<td>0.163</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.99 )</th>
<th>( \lambda = 0.75 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.185</td>
<td>-0.201</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.164</td>
<td>-0.189</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.135</td>
<td>-0.153</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.126</td>
<td>-0.153</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.177</td>
<td>0.196</td>
</tr>
<tr>
<td>0.1</td>
<td>0.185</td>
<td>0.201</td>
</tr>
<tr>
<td>0.2</td>
<td>0.183</td>
<td>0.197</td>
</tr>
<tr>
<td>0.3</td>
<td>0.177</td>
<td>0.191</td>
</tr>
<tr>
<td>0.4</td>
<td>0.164</td>
<td>0.172</td>
</tr>
<tr>
<td>0.5</td>
<td>0.157</td>
<td>0.163</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.99 )</th>
<th>( \lambda = 0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
<td>0.157</td>
</tr>
<tr>
<td>-0.4</td>
<td>0.157</td>
</tr>
<tr>
<td>-0.3</td>
<td>0.157</td>
</tr>
<tr>
<td>-0.2</td>
<td>0.157</td>
</tr>
<tr>
<td>-0.1</td>
<td>0.157</td>
</tr>
<tr>
<td>0.1</td>
<td>0.157</td>
</tr>
<tr>
<td>0.2</td>
<td>0.157</td>
</tr>
<tr>
<td>0.3</td>
<td>0.157</td>
</tr>
<tr>
<td>0.4</td>
<td>0.157</td>
</tr>
<tr>
<td>0.5</td>
<td>0.157</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
</tr>
<tr>
<td>-0.4</td>
</tr>
<tr>
<td>-0.3</td>
</tr>
<tr>
<td>-0.2</td>
</tr>
<tr>
<td>-0.1</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.3</td>
</tr>
<tr>
<td>0.4</td>
</tr>
<tr>
<td>0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
</tr>
<tr>
<td>-0.4</td>
</tr>
<tr>
<td>-0.3</td>
</tr>
<tr>
<td>-0.2</td>
</tr>
<tr>
<td>-0.1</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.3</td>
</tr>
<tr>
<td>0.4</td>
</tr>
<tr>
<td>0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \lambda = 0.99 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x/c )</td>
</tr>
<tr>
<td>-0.5</td>
</tr>
<tr>
<td>-0.4</td>
</tr>
<tr>
<td>-0.3</td>
</tr>
<tr>
<td>-0.2</td>
</tr>
<tr>
<td>-0.1</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.3</td>
</tr>
<tr>
<td>0.4</td>
</tr>
<tr>
<td>0.5</td>
</tr>
<tr>
<td>$x/c$</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
</tr>
<tr>
<td>0.50</td>
</tr>
<tr>
<td>0.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
</tbody>
</table>

**TABLE 11.8**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$, (x/c)

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
</tbody>
</table>

**TABLE 11.8**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$, (x/c)

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>0.25</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.50</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
<tr>
<td>0.75</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.18</td>
</tr>
</tbody>
</table>

**TABLE 11.8**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$, (x/c)
### Table 11.9

**Direct Propeller Contribution to Shroud Surface Pressure Coefficient \( c_{p} \)**

<table>
<thead>
<tr>
<th>( x/e )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( x/e )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( x/e )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
<th>( x/e )</th>
<th>( \lambda=0.25 )</th>
<th>( \lambda=0.50 )</th>
<th>( \lambda=0.75 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 0.9 \times 10^{-4} )</td>
<td>( -0.5 )</td>
<td>( -0.099 )</td>
<td>( -0.105 )</td>
<td>( -0.110 )</td>
<td>( -0.5 )</td>
<td>( -0.132 )</td>
<td>( -0.140 )</td>
<td>( -0.148 )</td>
<td>( -0.5 )</td>
<td>( -0.132 )</td>
<td>( -0.140 )</td>
<td>( -0.148 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.4 \times 10^{-1} )</td>
<td>( -0.097 )</td>
<td>( -0.077 )</td>
<td>( -0.081 )</td>
<td>( -0.107 )</td>
<td>( -0.113 )</td>
<td>( -0.119 )</td>
<td>( -0.123 )</td>
<td>( -0.125 )</td>
<td>( -0.105 )</td>
<td>( -0.113 )</td>
<td>( -0.120 )</td>
<td>( -0.125 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.3 )</td>
<td>( -0.227 )</td>
<td>( -0.099 )</td>
<td>( -0.031 )</td>
<td>( -0.052 )</td>
<td>( -0.055 )</td>
<td>( -0.059 )</td>
<td>( -0.072 )</td>
<td>( -0.077 )</td>
<td>( -0.045 )</td>
<td>( -0.049 )</td>
<td>( -0.052 )</td>
<td>( -0.059 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.2 )</td>
<td>( 0.027 )</td>
<td>( 0.029 )</td>
<td>( 0.031 )</td>
<td>( 0.052 )</td>
<td>( 0.055 )</td>
<td>( 0.059 )</td>
<td>( 0.072 )</td>
<td>( 0.077 )</td>
<td>( 0.045 )</td>
<td>( 0.049 )</td>
<td>( 0.052 )</td>
<td>( 0.059 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.1 )</td>
<td>( 0.070 )</td>
<td>( 0.077 )</td>
<td>( 0.081 )</td>
<td>( 0.107 )</td>
<td>( 0.113 )</td>
<td>( 0.119 )</td>
<td>( 0.120 )</td>
<td>( 0.125 )</td>
<td>( 0.105 )</td>
<td>( 0.113 )</td>
<td>( 0.120 )</td>
<td>( 0.125 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0 )</td>
<td>( 0.099 )</td>
<td>( 0.105 )</td>
<td>( 0.110 )</td>
<td>( 0.121 )</td>
<td>( 0.127 )</td>
<td>( 0.131 )</td>
<td>( 0.119 )</td>
<td>( 0.123 )</td>
<td>( 0.132 )</td>
<td>( 0.132 )</td>
<td>( 0.140 )</td>
<td>( 0.141 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.1 )</td>
<td>( 0.113 )</td>
<td>( 0.119 )</td>
<td>( 0.124 )</td>
<td>( 0.120 )</td>
<td>( 0.124 )</td>
<td>( 0.127 )</td>
<td>( 0.108 )</td>
<td>( 0.110 )</td>
<td>( 0.114 )</td>
<td>( 0.115 )</td>
<td>( 0.120 )</td>
<td>( 0.123 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.2 )</td>
<td>( 0.129 )</td>
<td>( 0.125 )</td>
<td>( 0.125 )</td>
<td>( 0.114 )</td>
<td>( 0.117 )</td>
<td>( 0.119 )</td>
<td>( 0.096 )</td>
<td>( 0.097 )</td>
<td>( 0.096 )</td>
<td>( 0.099 )</td>
<td>( 0.109 )</td>
<td>( 0.110 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.3 )</td>
<td>( 0.122 )</td>
<td>( 0.127 )</td>
<td>( 0.131 )</td>
<td>( 0.106 )</td>
<td>( 0.108 )</td>
<td>( 0.109 )</td>
<td>( 0.085 )</td>
<td>( 0.085 )</td>
<td>( 0.085 )</td>
<td>( 0.090 )</td>
<td>( 0.093 )</td>
<td>( 0.093 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.4 )</td>
<td>( 0.121 )</td>
<td>( 0.125 )</td>
<td>( 0.129 )</td>
<td>( 0.098 )</td>
<td>( 0.099 )</td>
<td>( 0.101 )</td>
<td>( 0.075 )</td>
<td>( 0.075 )</td>
<td>( 0.075 )</td>
<td>( 0.081 )</td>
<td>( 0.081 )</td>
<td>( 0.081 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 0.5 )</td>
<td>( 0.119 )</td>
<td>( 0.123 )</td>
<td>( 0.125 )</td>
<td>( 0.090 )</td>
<td>( 0.091 )</td>
<td>( 0.091 )</td>
<td>( 0.066 )</td>
<td>( 0.066 )</td>
<td>( 0.066 )</td>
<td>( 0.072 )</td>
<td>( 0.071 )</td>
<td>( 0.072 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ x = 0.9 \times 10^{-4} \]

\[ x = 0.4 \times 10^{-1} \]

\[ x = 0.3 \]

\[ x = 0.2 \]

\[ x = 0.1 \]

\[ x = 0 \]

\[ x = 0.1 \]

\[ x = 0.2 \]

\[ x = 0.3 \]

\[ x = 0.4 \]

\[ x = 0.5 \]
<table>
<thead>
<tr>
<th>(x/c)</th>
<th>(\lambda=0.25)</th>
<th>(\lambda=0.50)</th>
<th>(\lambda=0.75)</th>
<th>(x/c)</th>
<th>(\lambda=0.25)</th>
<th>(\lambda=0.50)</th>
<th>(\lambda=0.75)</th>
<th>(x/c)</th>
<th>(\lambda=0.25)</th>
<th>(\lambda=0.50)</th>
<th>(\lambda=0.75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-0.5)</td>
<td>-0.118 -0.124 -0.129</td>
<td>-0.109 -0.111 -0.113</td>
<td>-0.090 -0.091 -0.091</td>
<td>(-0.5)</td>
<td>-0.140 -0.147 -0.153</td>
<td>-0.122 -0.124 -0.126</td>
<td>-0.099 -0.099 -0.100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-0.4)</td>
<td>-0.113 -0.120 -0.125</td>
<td>-0.116 -0.119 -0.122</td>
<td>-0.101 -0.103 -0.104</td>
<td>(-0.4)</td>
<td>-0.138 -0.147 -0.154</td>
<td>-0.131 -0.135 -0.139</td>
<td>-0.112 -0.114 -0.115</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-0.3)</td>
<td>-0.103 -0.110 -0.116</td>
<td>-0.119 -0.124 -0.128</td>
<td>-0.113 -0.116 -0.118</td>
<td>(-0.3)</td>
<td>-0.132 -0.141 -0.150</td>
<td>-0.138 -0.144 -0.149</td>
<td>-0.126 -0.130 -0.132</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-0.2)</td>
<td>-0.083 -0.090 -0.095</td>
<td>-0.113 -0.120 -0.125</td>
<td>-0.119 -0.124 -0.128</td>
<td>(-0.2)</td>
<td>-0.144 -0.147 -0.154</td>
<td>-0.138 -0.144 -0.149</td>
<td>-0.126 -0.130 -0.132</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-0.1)</td>
<td>-0.049 -0.053 -0.057</td>
<td>-0.083 -0.090 -0.095</td>
<td>-0.103 -0.110 -0.116</td>
<td>(-0.1)</td>
<td>-0.075 -0.082 -0.089</td>
<td>-0.114 -0.124 -0.133</td>
<td>-0.132 -0.141 -0.150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.049 0.053 0.057</td>
<td>0.083 0.090 0.095</td>
<td>0.103 0.110 0.116</td>
<td>0.1</td>
<td>0.075 0.082 0.099</td>
<td>0.114 0.124 0.133</td>
<td>0.132 0.141 0.150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td>0.082 0.090 0.095</td>
<td>0.113 0.120 0.125</td>
<td>0.119 0.124 0.128</td>
<td>0.2</td>
<td>0.144 0.147 0.154</td>
<td>0.138 0.144 0.149</td>
<td>0.126 0.130 0.132</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.103 0.110 0.116</td>
<td>0.119 0.124 0.128</td>
<td>0.113 0.116 0.118</td>
<td>0.3</td>
<td>0.132 0.141 0.150</td>
<td>0.138 0.144 0.149</td>
<td>0.126 0.130 0.132</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.113 0.120 0.125</td>
<td>0.116 0.119 0.122</td>
<td>0.101 0.103 0.104</td>
<td>0.4</td>
<td>0.138 0.147 0.154</td>
<td>0.131 0.135 0.138</td>
<td>0.112 0.114 0.115</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>0.138 0.147 0.153</td>
<td>0.109 0.111 0.113</td>
<td>0.090 0.091 0.091</td>
<td>0.5</td>
<td>0.140 0.147 0.153</td>
<td>0.122 0.124 0.126</td>
<td>0.099 0.099 0.100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 11.10**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT \(c_p, (x/c)\)
### TABLE 11.1

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_{p, x}$ ($x/a$)

<table>
<thead>
<tr>
<th>$x/a$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x/a$</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>$x/a$</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.119</td>
<td>-0.125</td>
<td>-0.129</td>
<td>-0.119</td>
<td>-0.122</td>
<td>-0.113</td>
<td>-0.119</td>
<td>-0.122</td>
<td>-0.113</td>
</tr>
<tr>
<td>0.4</td>
<td>-0.104</td>
<td>-0.111</td>
<td>-0.116</td>
<td>-0.120</td>
<td>-0.124</td>
<td>-0.128</td>
<td>-0.120</td>
<td>-0.124</td>
<td>-0.128</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.089</td>
<td>-0.095</td>
<td>-0.099</td>
<td>-0.114</td>
<td>-0.121</td>
<td>-0.126</td>
<td>-0.120</td>
<td>-0.124</td>
<td>-0.128</td>
</tr>
<tr>
<td>0.2</td>
<td>-0.074</td>
<td>-0.078</td>
<td>-0.082</td>
<td>-0.084</td>
<td>-0.088</td>
<td>-0.092</td>
<td>-0.084</td>
<td>-0.088</td>
<td>-0.092</td>
</tr>
<tr>
<td>0.1</td>
<td>-0.059</td>
<td>-0.063</td>
<td>-0.067</td>
<td>-0.084</td>
<td>-0.090</td>
<td>-0.095</td>
<td>-0.084</td>
<td>-0.090</td>
<td>-0.095</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.054</td>
<td>0.058</td>
<td>0.062</td>
<td>0.084</td>
<td>0.090</td>
<td>0.095</td>
<td>0.104</td>
<td>0.111</td>
<td>0.116</td>
</tr>
<tr>
<td>0.2</td>
<td>0.084</td>
<td>0.090</td>
<td>0.095</td>
<td>0.114</td>
<td>0.121</td>
<td>0.126</td>
<td>0.120</td>
<td>0.124</td>
<td>0.128</td>
</tr>
<tr>
<td>0.3</td>
<td>0.104</td>
<td>0.111</td>
<td>0.116</td>
<td>0.120</td>
<td>0.124</td>
<td>0.128</td>
<td>0.120</td>
<td>0.124</td>
<td>0.128</td>
</tr>
<tr>
<td>0.4</td>
<td>0.114</td>
<td>0.121</td>
<td>0.126</td>
<td>0.116</td>
<td>0.120</td>
<td>0.122</td>
<td>0.102</td>
<td>0.103</td>
<td>0.104</td>
</tr>
<tr>
<td>0.5</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
<td>0.109</td>
<td>0.112</td>
<td>0.113</td>
<td>0.099</td>
<td>0.101</td>
<td>0.103</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/a$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x/a$</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>$x/a$</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.141</td>
<td>-0.148</td>
<td>-0.154</td>
<td>-0.122</td>
<td>-0.125</td>
<td>-0.126</td>
<td>-0.099</td>
<td>-0.099</td>
<td>-0.100</td>
</tr>
<tr>
<td>0.4</td>
<td>-0.134</td>
<td>-0.142</td>
<td>-0.150</td>
<td>-0.139</td>
<td>-0.145</td>
<td>-0.150</td>
<td>-0.127</td>
<td>-0.130</td>
<td>-0.133</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.116</td>
<td>-0.125</td>
<td>-0.133</td>
<td>-0.149</td>
<td>-0.148</td>
<td>-0.155</td>
<td>-0.139</td>
<td>-0.145</td>
<td>-0.150</td>
</tr>
<tr>
<td>0.2</td>
<td>-0.077</td>
<td>-0.083</td>
<td>-0.089</td>
<td>-0.116</td>
<td>-0.125</td>
<td>-0.133</td>
<td>-0.124</td>
<td>-0.142</td>
<td>-0.150</td>
</tr>
<tr>
<td>0.1</td>
<td>0.077</td>
<td>0.083</td>
<td>0.089</td>
<td>0.116</td>
<td>0.125</td>
<td>0.133</td>
<td>0.124</td>
<td>0.142</td>
<td>0.150</td>
</tr>
<tr>
<td>0.2</td>
<td>0.116</td>
<td>0.125</td>
<td>0.133</td>
<td>0.149</td>
<td>0.148</td>
<td>0.155</td>
<td>0.129</td>
<td>0.145</td>
<td>0.150</td>
</tr>
<tr>
<td>0.3</td>
<td>0.134</td>
<td>0.142</td>
<td>0.150</td>
<td>0.139</td>
<td>0.145</td>
<td>0.150</td>
<td>0.127</td>
<td>0.130</td>
<td>0.133</td>
</tr>
<tr>
<td>0.4</td>
<td>0.140</td>
<td>0.148</td>
<td>0.155</td>
<td>0.132</td>
<td>0.136</td>
<td>0.139</td>
<td>0.112</td>
<td>0.114</td>
<td>0.115</td>
</tr>
<tr>
<td>0.5</td>
<td>0.141</td>
<td>0.148</td>
<td>0.154</td>
<td>0.122</td>
<td>0.125</td>
<td>0.126</td>
<td>0.099</td>
<td>0.099</td>
<td>0.100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/a$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x/a$</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>$x/a$</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
<td>J=0.40</td>
<td>J=0.60</td>
<td>J=0.80</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.175</td>
<td>-0.182</td>
<td>-0.189</td>
<td>-0.139</td>
<td>-0.142</td>
<td>-0.144</td>
<td>-0.110</td>
<td>-0.111</td>
<td>-0.111</td>
</tr>
<tr>
<td>0.4</td>
<td>-0.178</td>
<td>-0.189</td>
<td>-0.198</td>
<td>-0.152</td>
<td>-0.157</td>
<td>-0.160</td>
<td>-0.126</td>
<td>-0.128</td>
<td>-0.129</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.181</td>
<td>-0.193</td>
<td>-0.205</td>
<td>-0.169</td>
<td>-0.173</td>
<td>-0.179</td>
<td>-0.145</td>
<td>-0.149</td>
<td>-0.152</td>
</tr>
<tr>
<td>0.2</td>
<td>-0.177</td>
<td>-0.191</td>
<td>-0.205</td>
<td>-0.178</td>
<td>-0.189</td>
<td>-0.198</td>
<td>-0.166</td>
<td>-0.173</td>
<td>-0.179</td>
</tr>
<tr>
<td>0.1</td>
<td>-0.154</td>
<td>-0.169</td>
<td>-0.184</td>
<td>-0.177</td>
<td>-0.191</td>
<td>-0.206</td>
<td>-0.181</td>
<td>-0.193</td>
<td>-0.205</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.154</td>
<td>0.169</td>
<td>0.184</td>
<td>0.177</td>
<td>0.191</td>
<td>0.205</td>
<td>0.181</td>
<td>0.193</td>
<td>0.205</td>
</tr>
<tr>
<td>0.2</td>
<td>0.177</td>
<td>0.191</td>
<td>0.205</td>
<td>0.178</td>
<td>0.189</td>
<td>0.198</td>
<td>0.166</td>
<td>0.173</td>
<td>0.179</td>
</tr>
<tr>
<td>0.3</td>
<td>0.181</td>
<td>0.193</td>
<td>0.205</td>
<td>0.166</td>
<td>0.173</td>
<td>0.179</td>
<td>0.145</td>
<td>0.149</td>
<td>0.152</td>
</tr>
<tr>
<td>0.4</td>
<td>0.178</td>
<td>0.189</td>
<td>0.198</td>
<td>0.152</td>
<td>0.157</td>
<td>0.160</td>
<td>0.126</td>
<td>0.128</td>
<td>0.129</td>
</tr>
<tr>
<td>0.5</td>
<td>0.173</td>
<td>0.182</td>
<td>0.189</td>
<td>0.139</td>
<td>0.142</td>
<td>0.144</td>
<td>0.110</td>
<td>0.111</td>
<td>0.111</td>
</tr>
</tbody>
</table>
### TABLE 11.12

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_{p_s}$ ($x/c$)

<table>
<thead>
<tr>
<th>$x/c$</th>
<th>$x=0.25$</th>
<th>$x=0.5$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$u=0.900$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.121</td>
<td>-0.125</td>
<td>-0.120</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.116</td>
<td>-0.122</td>
<td>-0.127</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.112</td>
<td>-0.117</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.087</td>
<td>-0.092</td>
<td>-0.096</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.051</td>
<td>-0.056</td>
<td>-0.058</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.051</td>
<td>0.054</td>
<td>0.058</td>
</tr>
<tr>
<td>0.2</td>
<td>0.087</td>
<td>0.092</td>
<td>0.096</td>
</tr>
<tr>
<td>0.3</td>
<td>0.107</td>
<td>0.112</td>
<td>0.117</td>
</tr>
<tr>
<td>0.4</td>
<td>0.116</td>
<td>0.122</td>
<td>0.127</td>
</tr>
<tr>
<td>0.5</td>
<td>0.121</td>
<td>0.126</td>
<td>0.130</td>
</tr>
</tbody>
</table>

| $x=0.900$ |         |          |          |
| -0.5  | -0.144   | -0.150   | -0.155   |
| -0.4  | -0.143   | -0.150   | -0.156   |
| -0.3  | -0.137   | -0.144   | -0.152   |
| -0.2  | -0.120   | -0.127   | -0.135   |
| -0.1  | -0.070   | -0.085   | -0.099   |
| 0     | 0         | 0         | 0         |
| 0.1   | 0.079    | 0.085    | 0.090    |
| 0.2   | 0.120    | 0.127    | 0.135    |
| 0.3   | 0.137    | 0.144    | 0.152    |
| 0.4   | 0.143    | 0.150    | 0.156    |
| 0.5   | 0.144    | 0.150    | 0.155    |

| $x=0.910$ |         |          |          |
| -0.5  | -0.162   | -0.170   | -0.176   |
| -0.4  | -0.165   | -0.174   | -0.181   |
| -0.3  | -0.157   | -0.163   | -0.168   |
| -0.2  | -0.155   | -0.165   | -0.175   |
| -0.1  | -0.119   | -0.128   | -0.137   |
| 0     | 0         | 0         | 0         |
| 0.1   | 0.119    | 0.128    | 0.137    |
| 0.2   | 0.155    | 0.165    | 0.175    |
| 0.3   | 0.165    | 0.174    | 0.183    |
| 0.4   | 0.165    | 0.174    | 0.183    |
| 0.5   | 0.162    | 0.170    | 0.176    |

| $x=0.900$ |         |          |          |
| -0.5  | -0.175   | -0.183   | -0.190   |
| -0.4  | -0.181   | -0.191   | -0.199   |
| -0.3  | -0.185   | -0.196   | -0.207   |
| -0.2  | -0.183   | -0.195   | -0.208   |
| -0.1  | -0.161   | -0.173   | -0.187   |
| 0     | 0         | 0         | 0         |
| 0.1   | 0.161    | 0.173    | 0.187    |
| 0.2   | 0.182    | 0.195    | 0.208    |
| 0.3   | 0.185    | 0.196    | 0.207    |
| 0.4   | 0.181    | 0.191    | 0.199    |
| 0.5   | 0.175    | 0.183    | 0.190    |

$x$ values correspond to the table entries.
<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
</tbody>
</table>

**TABLE 11.13**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$ (x/c)

<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
</tbody>
</table>

**TABLE 11.13**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$ (x/c)

<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.3</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.4</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
<tr>
<td>x</td>
<td></td>
<td></td>
<td>J=0.75</td>
</tr>
</tbody>
</table>
## Table 11.14

<table>
<thead>
<tr>
<th>λ/c</th>
<th>x=0.25</th>
<th>x=0.50</th>
<th>x=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.25</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.119</td>
<td>-0.125</td>
<td>-0.130</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.115</td>
<td>-0.121</td>
<td>-0.128</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.105</td>
<td>-0.111</td>
<td>-0.117</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.085</td>
<td>-0.091</td>
<td>-0.096</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.050</td>
<td>-0.054</td>
<td>-0.057</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.050</td>
<td>0.054</td>
<td>0.057</td>
</tr>
<tr>
<td>0.2</td>
<td>0.085</td>
<td>0.091</td>
<td>0.096</td>
</tr>
<tr>
<td>0.3</td>
<td>0.105</td>
<td>0.111</td>
<td>0.117</td>
</tr>
<tr>
<td>0.4</td>
<td>0.115</td>
<td>0.121</td>
<td>0.126</td>
</tr>
<tr>
<td>0.5</td>
<td>0.119</td>
<td>0.125</td>
<td>0.130</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>λ=0.50</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.120</td>
<td>-0.125</td>
<td>-0.130</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.116</td>
<td>-0.121</td>
<td>-0.128</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.106</td>
<td>-0.112</td>
<td>-0.117</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.086</td>
<td>-0.092</td>
<td>-0.097</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.051</td>
<td>-0.055</td>
<td>-0.059</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.051</td>
<td>0.055</td>
<td>0.059</td>
</tr>
<tr>
<td>0.2</td>
<td>0.087</td>
<td>0.092</td>
<td>0.097</td>
</tr>
<tr>
<td>0.3</td>
<td>0.106</td>
<td>0.112</td>
<td>0.117</td>
</tr>
<tr>
<td>0.4</td>
<td>0.116</td>
<td>0.122</td>
<td>0.128</td>
</tr>
<tr>
<td>0.5</td>
<td>0.119</td>
<td>0.125</td>
<td>0.130</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>λ=0.25</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.50</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>λ=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.121</td>
<td>-0.126</td>
<td>-0.131</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.117</td>
<td>-0.122</td>
<td>-0.128</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.113</td>
<td>-0.119</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.087</td>
<td>-0.093</td>
<td>-0.098</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.052</td>
<td>-0.056</td>
<td>-0.061</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.052</td>
<td>0.056</td>
<td>0.061</td>
</tr>
<tr>
<td>0.2</td>
<td>0.088</td>
<td>0.093</td>
<td>0.098</td>
</tr>
<tr>
<td>0.3</td>
<td>0.108</td>
<td>0.114</td>
<td>0.119</td>
</tr>
<tr>
<td>0.4</td>
<td>0.118</td>
<td>0.124</td>
<td>0.130</td>
</tr>
<tr>
<td>0.5</td>
<td>0.121</td>
<td>0.127</td>
<td>0.132</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 11.15
DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$ ($k_{x,c}$)

<table>
<thead>
<tr>
<th>$\lambda = 0.25$</th>
<th>$\lambda = 0.50$</th>
<th>$\lambda = 0.75$</th>
<th>$\lambda = 0.25$</th>
<th>$\lambda = 0.50$</th>
<th>$\lambda = 0.75$</th>
<th>$\lambda = 0.25$</th>
<th>$\lambda = 0.50$</th>
<th>$\lambda = 0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k_{x,c}$ &lt; 0.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.121</td>
<td>-0.126</td>
<td>-0.130</td>
<td>-0.110</td>
<td>-0.112</td>
<td>-0.114</td>
<td>-0.090</td>
<td>-0.091</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.117</td>
<td>-0.122</td>
<td>-0.127</td>
<td>-0.117</td>
<td>-0.120</td>
<td>-0.123</td>
<td>-0.102</td>
<td>-0.103</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.113</td>
<td>-0.118</td>
<td>-0.121</td>
<td>-0.126</td>
<td>-0.129</td>
<td>-0.114</td>
<td>-0.116</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.087</td>
<td>-0.092</td>
<td>-0.097</td>
<td>-0.117</td>
<td>-0.122</td>
<td>-0.127</td>
<td>-0.121</td>
<td>-0.126</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.052</td>
<td>-0.053</td>
<td>-0.058</td>
<td>-0.087</td>
<td>-0.092</td>
<td>-0.097</td>
<td>-0.107</td>
<td>-0.113</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.052</td>
<td>0.053</td>
<td>0.058</td>
<td>0.087</td>
<td>0.092</td>
<td>0.097</td>
<td>0.107</td>
<td>0.113</td>
</tr>
<tr>
<td>0.2</td>
<td>0.097</td>
<td>0.092</td>
<td>0.097</td>
<td>0.117</td>
<td>0.122</td>
<td>0.127</td>
<td>0.121</td>
<td>0.126</td>
</tr>
<tr>
<td>0.3</td>
<td>0.107</td>
<td>0.113</td>
<td>0.118</td>
<td>0.121</td>
<td>0.126</td>
<td>0.129</td>
<td>0.114</td>
<td>0.116</td>
</tr>
<tr>
<td>0.4</td>
<td>0.117</td>
<td>0.122</td>
<td>0.127</td>
<td>0.117</td>
<td>0.120</td>
<td>0.123</td>
<td>0.102</td>
<td>0.103</td>
</tr>
<tr>
<td>0.5</td>
<td>0.121</td>
<td>0.126</td>
<td>0.130</td>
<td>0.110</td>
<td>0.112</td>
<td>0.114</td>
<td>0.090</td>
<td>0.091</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$k_{x,c}$ &lt; 0.97</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.5</td>
<td>-0.163</td>
<td>-0.176</td>
<td>-0.186</td>
<td>-0.123</td>
<td>-0.135</td>
<td>-0.137</td>
<td>-0.109</td>
<td>-0.109</td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.166</td>
<td>-0.175</td>
<td>-0.182</td>
<td>-0.145</td>
<td>-0.149</td>
<td>-0.152</td>
<td>-0.123</td>
<td>-0.123</td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.185</td>
<td>-0.175</td>
<td>-0.184</td>
<td>-0.157</td>
<td>-0.163</td>
<td>-0.168</td>
<td>-0.139</td>
<td>-0.142</td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.156</td>
<td>-0.165</td>
<td>-0.176</td>
<td>-0.166</td>
<td>-0.175</td>
<td>-0.182</td>
<td>-0.157</td>
<td>-0.163</td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.120</td>
<td>-0.129</td>
<td>-0.139</td>
<td>-0.156</td>
<td>-0.166</td>
<td>-0.176</td>
<td>-0.165</td>
<td>-0.175</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.120</td>
<td>0.129</td>
<td>0.139</td>
<td>0.156</td>
<td>0.166</td>
<td>0.176</td>
<td>0.165</td>
<td>0.175</td>
</tr>
<tr>
<td>0.2</td>
<td>0.156</td>
<td>0.165</td>
<td>0.176</td>
<td>0.166</td>
<td>0.175</td>
<td>0.182</td>
<td>0.157</td>
<td>0.163</td>
</tr>
<tr>
<td>0.3</td>
<td>0.165</td>
<td>0.175</td>
<td>0.184</td>
<td>0.157</td>
<td>0.163</td>
<td>0.168</td>
<td>0.129</td>
<td>0.142</td>
</tr>
<tr>
<td>0.4</td>
<td>0.160</td>
<td>0.175</td>
<td>0.182</td>
<td>0.145</td>
<td>0.149</td>
<td>0.152</td>
<td>0.121</td>
<td>0.123</td>
</tr>
<tr>
<td>0.5</td>
<td>0.163</td>
<td>0.170</td>
<td>0.170</td>
<td>0.123</td>
<td>0.125</td>
<td>0.127</td>
<td>0.106</td>
<td>0.105</td>
</tr>
</tbody>
</table>

$x$ 0 0 0 0 0 0 0 0 0

**Footnote:**

- $\lambda$ represents the propeller advance ratio.
- $k_{x,c}$ is the coefficient for the shroud surface pressure.
- $c_p$ is the pressure coefficient.

Table entries are calculated based on the given parameters and are subject to specific formulas or methods not explicitly detailed here.
<table>
<thead>
<tr>
<th>$x/\lambda$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\lambda=0.25$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.5</td>
<td>-0.119</td>
<td>-0.125</td>
<td>-0.130</td>
<td>-0.109</td>
<td>-0.112</td>
<td>-0.113</td>
<td>-0.090</td>
<td>-0.091</td>
<td>-0.091</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.4</td>
<td>-0.114</td>
<td>-0.121</td>
<td>-0.127</td>
<td>-0.116</td>
<td>-0.120</td>
<td>-0.122</td>
<td>-0.102</td>
<td>-0.103</td>
<td>-0.104</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.3</td>
<td>-0.104</td>
<td>-0.111</td>
<td>-0.117</td>
<td>-0.119</td>
<td>-0.125</td>
<td>-0.129</td>
<td>-0.113</td>
<td>-0.116</td>
<td>-0.118</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.2</td>
<td>-0.084</td>
<td>-0.091</td>
<td>-0.097</td>
<td>-0.114</td>
<td>-0.123</td>
<td>-0.127</td>
<td>-0.119</td>
<td>-0.125</td>
<td>-0.128</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.1</td>
<td>-0.050</td>
<td>-0.054</td>
<td>-0.058</td>
<td>-0.064</td>
<td>-0.069</td>
<td>-0.072</td>
<td>-0.064</td>
<td>-0.068</td>
<td>-0.072</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.050</td>
<td>0.054</td>
<td>0.058</td>
<td>0.064</td>
<td>0.069</td>
<td>0.072</td>
<td>0.064</td>
<td>0.068</td>
<td>0.072</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td>0.084</td>
<td>0.091</td>
<td>0.097</td>
<td>0.114</td>
<td>0.121</td>
<td>0.127</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.104</td>
<td>0.111</td>
<td>0.117</td>
<td>0.119</td>
<td>0.125</td>
<td>0.129</td>
<td>0.133</td>
<td>0.136</td>
<td>0.138</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.114</td>
<td>0.121</td>
<td>0.127</td>
<td>0.116</td>
<td>0.120</td>
<td>0.125</td>
<td>0.102</td>
<td>0.103</td>
<td>0.104</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>0.119</td>
<td>0.125</td>
<td>0.130</td>
<td>0.109</td>
<td>0.112</td>
<td>0.113</td>
<td>0.090</td>
<td>0.091</td>
<td>0.091</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$x$</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda=0.50$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda=0.75$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/\lambda$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\lambda=0.900$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda=0.940$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\lambda=0.984$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x/\lambda$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
<th>$x=0.25$</th>
<th>$x=0.50$</th>
<th>$x=0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$e^{-0.994}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x/c</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
<td>J=0.25</td>
<td>J=0.50</td>
<td>J=0.75</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.120</td>
<td>-0.126</td>
<td>-0.136</td>
<td>-0.110</td>
<td>-0.112</td>
<td>-0.114</td>
<td>-0.090</td>
<td>-0.091</td>
<td>-0.091</td>
<td>-0.122</td>
<td>-0.125</td>
<td>-0.127</td>
</tr>
<tr>
<td>0.4</td>
<td>-0.115</td>
<td>-0.122</td>
<td>-0.127</td>
<td>-0.117</td>
<td>-0.120</td>
<td>-0.123</td>
<td>-0.102</td>
<td>-0.103</td>
<td>-0.104</td>
<td>-0.122</td>
<td>-0.126</td>
<td>-0.129</td>
</tr>
<tr>
<td>0.3</td>
<td>-0.105</td>
<td>-0.112</td>
<td>-0.118</td>
<td>-0.120</td>
<td>-0.125</td>
<td>-0.129</td>
<td>-0.113</td>
<td>-0.116</td>
<td>-0.118</td>
<td>-0.112</td>
<td>-0.114</td>
<td>-0.115</td>
</tr>
<tr>
<td>0.2</td>
<td>-0.086</td>
<td>-0.092</td>
<td>-0.097</td>
<td>-0.115</td>
<td>-0.122</td>
<td>-0.127</td>
<td>-0.120</td>
<td>-0.125</td>
<td>-0.129</td>
<td>-0.120</td>
<td>-0.125</td>
<td>-0.129</td>
</tr>
<tr>
<td>0.1</td>
<td>-0.051</td>
<td>-0.055</td>
<td>-0.058</td>
<td>-0.086</td>
<td>-0.092</td>
<td>-0.097</td>
<td>-0.105</td>
<td>-0.112</td>
<td>-0.118</td>
<td>-0.105</td>
<td>-0.112</td>
<td>-0.118</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.051</td>
<td>0.055</td>
<td>0.058</td>
<td>0.096</td>
<td>0.092</td>
<td>0.097</td>
<td>0.105</td>
<td>0.112</td>
<td>0.118</td>
<td>0.105</td>
<td>0.112</td>
<td>0.118</td>
</tr>
<tr>
<td>0.2</td>
<td>0.095</td>
<td>0.092</td>
<td>0.097</td>
<td>0.115</td>
<td>0.122</td>
<td>0.127</td>
<td>0.120</td>
<td>0.125</td>
<td>0.129</td>
<td>0.120</td>
<td>0.125</td>
<td>0.129</td>
</tr>
<tr>
<td>0.3</td>
<td>0.105</td>
<td>0.112</td>
<td>0.118</td>
<td>0.120</td>
<td>0.125</td>
<td>0.129</td>
<td>0.113</td>
<td>0.118</td>
<td>0.118</td>
<td>0.120</td>
<td>0.125</td>
<td>0.129</td>
</tr>
<tr>
<td>0.4</td>
<td>0.115</td>
<td>0.122</td>
<td>0.127</td>
<td>0.117</td>
<td>0.120</td>
<td>0.123</td>
<td>0.102</td>
<td>0.103</td>
<td>0.104</td>
<td>0.102</td>
<td>0.103</td>
<td>0.104</td>
</tr>
<tr>
<td>0.5</td>
<td>0.120</td>
<td>0.129</td>
<td>0.130</td>
<td>0.110</td>
<td>0.112</td>
<td>0.114</td>
<td>0.090</td>
<td>0.091</td>
<td>0.091</td>
<td>0.090</td>
<td>0.091</td>
<td>0.091</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x/c</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
<th>J=0.25</th>
<th>J=0.50</th>
<th>J=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
<td>0.994</td>
</tr>
</tbody>
</table>

**Table 11.17**

DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $c_p$ ($x/c$)
<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.5</td>
<td>0.5</td>
<td>-0.121</td>
<td>-0.127</td>
</tr>
<tr>
<td></td>
<td>-0.4</td>
<td>-0.117</td>
<td>-0.123</td>
</tr>
<tr>
<td></td>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.113</td>
</tr>
<tr>
<td></td>
<td>-0.2</td>
<td>-0.098</td>
<td>-0.093</td>
</tr>
<tr>
<td></td>
<td>-0.1</td>
<td>-0.052</td>
<td>-0.055</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.052</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>0.098</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.107</td>
<td>0.113</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>0.117</td>
<td>0.123</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.121</td>
<td>0.127</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.9</td>
<td>0.5</td>
<td>-0.121</td>
<td>-0.127</td>
</tr>
<tr>
<td></td>
<td>-0.4</td>
<td>-0.117</td>
<td>-0.123</td>
</tr>
<tr>
<td></td>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.113</td>
</tr>
<tr>
<td></td>
<td>-0.2</td>
<td>-0.098</td>
<td>-0.093</td>
</tr>
<tr>
<td></td>
<td>-0.1</td>
<td>-0.052</td>
<td>-0.055</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.052</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>0.098</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.107</td>
<td>0.113</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>0.117</td>
<td>0.123</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.121</td>
<td>0.127</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x/c</th>
<th>λ=0.25</th>
<th>λ=0.50</th>
<th>λ=0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ=0.99</td>
<td>0.5</td>
<td>-0.121</td>
<td>-0.127</td>
</tr>
<tr>
<td></td>
<td>-0.4</td>
<td>-0.117</td>
<td>-0.123</td>
</tr>
<tr>
<td></td>
<td>-0.3</td>
<td>-0.107</td>
<td>-0.113</td>
</tr>
<tr>
<td></td>
<td>-0.2</td>
<td>-0.098</td>
<td>-0.093</td>
</tr>
<tr>
<td></td>
<td>-0.1</td>
<td>-0.052</td>
<td>-0.055</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.052</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>0.098</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.107</td>
<td>0.113</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>0.117</td>
<td>0.123</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.121</td>
<td>0.127</td>
</tr>
</tbody>
</table>

TABLE 11.18
DIRECT PROPELLER CONTRIBUTION TO SHROUD SURFACE PRESSURE COEFFICIENT $C_{P_{s}} (x/c)$
TABLES 12.1 - 12.2

LINEARIZED, TWO-DIMENSIONAL CONTRIBUTION
OF SHROUD THICKNESS TO SHROUD SURFACE PRESSURE COEFFICIENT \( c_f^{2D}(x/c) \)
FOR NACA 4-, 5- AND 6-DIGIT AIRFOIL SECTIONS

\[
c_f^{2D}(x/c) = -2 \left[ \frac{v(x/c)}{V} - 1 \right]
\]

See Ref. 13, Appendix I, for values of \( \frac{v(x/c)}{V} \)

Accuracy: \( \pm 0.001 \)
### Table 12.1

**LINEARIZED, TWO-DIMENSIONAL CONTRIBUTION OF SHROUD THICKNESS TO SHROUD SURFACE PRESSURE COEFFICIENT $C_{2D}^p$ ($c/c$)**

<table>
<thead>
<tr>
<th>x/c</th>
<th>$t_m/c = 0.00$</th>
<th>$t_m/c = 0.03$</th>
<th>$t_m/c = 0.09$</th>
<th>$t_m/c = 0.12$</th>
<th>$t_m/c = 0.15$</th>
<th>$t_m/c = 0.18$</th>
<th>$t_m/c = 0.21$</th>
<th>$t_m/c = 0.24$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.50</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
</tr>
<tr>
<td>-0.40</td>
<td>-0.202</td>
<td>-0.260</td>
<td>-0.288</td>
<td>-0.316</td>
<td>-0.376</td>
<td>-0.466</td>
<td>-0.552</td>
<td>-0.654</td>
</tr>
<tr>
<td>-0.30</td>
<td>-0.152</td>
<td>-0.244</td>
<td>-0.274</td>
<td>-0.296</td>
<td>-0.356</td>
<td>-0.458</td>
<td>-0.550</td>
<td>-0.640</td>
</tr>
<tr>
<td>-0.20</td>
<td>-0.156</td>
<td>-0.212</td>
<td>-0.238</td>
<td>-0.266</td>
<td>-0.324</td>
<td>-0.408</td>
<td>-0.494</td>
<td>-0.580</td>
</tr>
<tr>
<td>-0.10</td>
<td>-0.132</td>
<td>-0.178</td>
<td>-0.200</td>
<td>-0.224</td>
<td>-0.270</td>
<td>-0.346</td>
<td>-0.419</td>
<td>-0.489</td>
</tr>
<tr>
<td>0</td>
<td>-0.106</td>
<td>-0.144</td>
<td>-0.164</td>
<td>-0.182</td>
<td>-0.216</td>
<td>-0.262</td>
<td>-0.309</td>
<td>-0.356</td>
</tr>
<tr>
<td>0.10</td>
<td>-0.084</td>
<td>-0.108</td>
<td>-0.122</td>
<td>-0.124</td>
<td>-0.160</td>
<td>-0.190</td>
<td>-0.232</td>
<td>-0.266</td>
</tr>
<tr>
<td>0.20</td>
<td>-0.056</td>
<td>-0.078</td>
<td>-0.096</td>
<td>-0.092</td>
<td>-0.105</td>
<td>-0.128</td>
<td>-0.148</td>
<td>-0.170</td>
</tr>
<tr>
<td>0.30</td>
<td>-0.026</td>
<td>-0.034</td>
<td>-0.036</td>
<td>-0.040</td>
<td>-0.044</td>
<td>-0.048</td>
<td>-0.050</td>
<td>-0.054</td>
</tr>
<tr>
<td>0.40</td>
<td>0.020</td>
<td>0.032</td>
<td>0.035</td>
<td>0.040</td>
<td>0.044</td>
<td>0.054</td>
<td>0.068</td>
<td>0.086</td>
</tr>
<tr>
<td>0.50</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
</tr>
<tr>
<td>$x/c$</td>
<td>$t_m/c = 0.06$</td>
<td>$t_m/c = 0.12$</td>
<td>$t_m/c = 0.18$</td>
<td>$t_m/c = 0.06$</td>
<td>$t_m/c = 0.12$</td>
<td>$t_m/c = 0.18$</td>
<td>$t_m/c = 0.06$</td>
<td>$t_m/c = 0.12$</td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>-0.50</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>-0.50</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>-0.50</td>
</tr>
<tr>
<td>-0.50</td>
<td>-0.144</td>
<td>-0.276</td>
<td>-0.385</td>
<td>-0.40</td>
<td>-0.116</td>
<td>-0.220</td>
<td>-0.306</td>
<td>-0.40</td>
</tr>
<tr>
<td>0.30</td>
<td>-0.158</td>
<td>-0.322</td>
<td>-0.488</td>
<td>-0.30</td>
<td>-0.148</td>
<td>-0.298</td>
<td>-0.468</td>
<td>-0.30</td>
</tr>
<tr>
<td>-0.20</td>
<td>-0.168</td>
<td>-0.340</td>
<td>-0.528</td>
<td>-0.20</td>
<td>-0.150</td>
<td>-0.324</td>
<td>-0.500</td>
<td>-0.20</td>
</tr>
<tr>
<td>-0.10</td>
<td>-0.158</td>
<td>-0.322</td>
<td>-0.490</td>
<td>-0.10</td>
<td>-0.164</td>
<td>-0.342</td>
<td>-0.530</td>
<td>-0.10</td>
</tr>
<tr>
<td>0</td>
<td>-0.132</td>
<td>-0.260</td>
<td>-0.376</td>
<td>0</td>
<td>-0.138</td>
<td>-0.272</td>
<td>-0.396</td>
<td>0</td>
</tr>
<tr>
<td>0.10</td>
<td>-0.094</td>
<td>-0.174</td>
<td>-0.238</td>
<td>0.10</td>
<td>-0.100</td>
<td>-0.186</td>
<td>-0.256</td>
<td>0.10</td>
</tr>
<tr>
<td>0.20</td>
<td>-0.046</td>
<td>-0.074</td>
<td>-0.086</td>
<td>0.20</td>
<td>-0.054</td>
<td>-0.083</td>
<td>-0.106</td>
<td>0.20</td>
</tr>
<tr>
<td>0.30</td>
<td>0.006</td>
<td>0.032</td>
<td>0.068</td>
<td>0.30</td>
<td>0.000</td>
<td>0.020</td>
<td>0.048</td>
<td>0.30</td>
</tr>
<tr>
<td>0.40</td>
<td>0.006</td>
<td>0.134</td>
<td>0.204</td>
<td>0.40</td>
<td>0.056</td>
<td>0.120</td>
<td>0.196</td>
<td>0.40</td>
</tr>
<tr>
<td>0.50</td>
<td>0.118</td>
<td>0.222</td>
<td>0.312</td>
<td>0.50</td>
<td>0.148</td>
<td>0.270</td>
<td>0.378</td>
<td>0.50</td>
</tr>
</tbody>
</table>

TABLE 12.2
LINEARIZED, TWO-DIMENSIONAL CONTRIBUTION
OF SHROUD THICKNESS TO SHROUD SURFACE PRESSURE COEFFICIENT $\eta^{2D}(x/c)$