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Low Pressures Research  
College Avenue Pool  
Institute of Eng. Research  
University of California  
Berkeley 4, California  
March 23, 1953

DIRECTOR  
Office of Naval Research  
1000 Geary Street  
San Francisco 9, California

MONTHLY STATUS REPORT - FEBRUARY 1953

Contract N7-onr-295-Task 3  
Project Number NR 061-003

Dear Sir:

Progress on the contract for the month of February has been as follows:

1. Traverses of a molecular beam reflected from a steel surface have been completed. Tests with an etched steel surface are underway. Data have been recorded for various specimen temperatures both in and out of the incident plane as well as in the incident and reflected quadrants. Further tests are planned using other surfaces.
2. During the month of February the No. 3 Wind Tunnel was used to study the problems associated with the creation of a normal shock by means of a suitably designed cylindrical channel located in the air stream. Proper manipulation of a flow impedance at the downstream end of the channel permits the formation of a stable normal shock at the head of the channel. Suitable free molecule flow wire probes will be used in a program to investigate the structure of the shock wave. The above program is part of a separate contract with the National Advisory Committee for Aeronautics.
3. Bench testing of the cone drag balance has been completed. Tests are scheduled in the No. 3 Wind Tunnel in March.
4. The new rotating cylinder balance is nearing completion and further drag tests are being planned.
5. The following reports are in various stages of preparation:
  - a) A report describing the design and operational tests of the rotating cylinder equipment for use in low density gas dynamics research has been completed and is being reproduced.
  - b) A report describing base pressure studies using cone-cylinder models is being prepared.

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6. The following report was issued in February: HE-150-108, "Heat Transfer from Spheres to a Rarefied Gas in Subsonic Flow", by L. L. Kavanau and R. M. Drake, Jr.

Abstract: Experimental average over-all heat transfer coefficients for spheres in a rarefied subsonic air stream are presented. The Mach and Reynolds number range is from 0.1 to 0.69 and 1.7 to 124, respectively. A semi-empirical formulation of the Nusselts number for spheres in a rarefied subsonic air stream is obtained by correcting the continuum solution for an effective thermal contact resistance due to the temperature jump boundary condition. The data follows the same trends exhibited in a previous report, HE-150-78, "Heat Transfer from Spheres in Supersonic Flow in a Rarefied Gas" by R. M. Drake, Jr. and G. H. Backer.

7. The following persons visited the Project during February:

Luigi Crocco - Princeton University, Princeton, New Jersey

Very truly yours,



S. A. Schaaf  
Faculty Investigator

SAS:ds

- cc: 1 ONR San Francisco
- 3 ONR Washington, D.C.
- 2 OSR, Fluid Mechanics Branch  
Research and Development Command  
P. O. Box 1395, Baltimore, Md.
- 1 Dr. Morton Alperin  
Hdqrs ARDC  
P. O. Box 2035  
Pasadena 2, Calif.

## RECENT TECHNICAL PUBLIC PRESENTATIONS

During the last year Professor R. E. Folsom has been asked to speak in a non-technical manner for several groups. In these talks he has referred to the theoretical and experimental work being done in rarefied gas dynamics at Berkeley under the auspices of the Office of Naval Research, Air Research and Development Command, Wright-Patterson Air Development Center, and the National Advisory Committee for Aeronautics. In each case these organizations have been given credit for supporting financially the research work being carried out at Berkeley. The following addresses have been given:

1. "Superaerodynamics", Richmond Exchange Club, April 5, 1951
2. "Superaerodynamics", Berkeley Exchange Club, April 19, 1951
3. "Superaerodynamics" ("Rockets to You"), Berkeley Masonic Lodge, May 3, 1951
4. "Superaerodynamics", Berkeley Breakfast Club, June 16, 1951
5. "Space Exploration", KRON-TV Program "Science in Action", San Francisco, November 25, 1952
6. "Why Rockets?", Berkeley Lions Club, January 15, 1953
7. "Rockets", Purchasing Agents Club, Leanington Hotel, Oakland, February 10, 1953
8. "Rockets", Junior Chamber of Commerce, Berkeley, February 20, 1953
9. "Space Exploration", Student Chapters ASME, AIChE, IAS, University of California, Berkeley, March 10, 1953
10. "Jet Propulsion", Sigma Xi Club, Davis, California, April 9, 1953