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FINAL REPORT

Project Title: Proposal for Sponsoring the First International Conference on DNS/LES

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Final Report on AFOSR Grant F49620-97-1-0034

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1 INTRODUCTION

The FIRST AFOSR INTERNATIONAL CONFERENCE ON DIRECT NUMERICAL SIMULATION (DNS) AND LARGE EDDY SIMULATION (LES) (FAICDL), sponsored by the US Air Force Office of Scientific Research (AFOSR), was held in Louisiana Tech University, Ruston, Louisiana, USA on August 4-8, 1997.

The conference attracted 93 participants from 16 countries all over the world including most leading scientists in the area of DNS and LES.

Direct Numerical Simulation (DNS) refers to accurate numerical solution of three-dimensional, time-dependent Navier-Stokes equations for both flow transition and turbulence. DNS is the only numerical approach dealing with the exact solution of 3-D time-dependent N-S equations without any ad hoc assumption and in which all time and space length scales are taken into account.

Large Eddy Simulation (LES) is a technique for extending turbulence simulation to higher Reynolds numbers than those can be achieved by DNS. Its effectiveness relies on representing the smallest scales of turbulent motion by a sub-grid model.

DNS or LES was thought useful only for low Reynolds number flow and simple geometry. However, during the past decade, the capability of DNS and LES for flow prediction has been dramatically enhanced as a result of rapid advancement in computer technology and numerical algorithm. Nowadays, more and more researchers apply DNS or LES for more general geometries and higher Reynolds numbers.

To promote the advancement of DNS/LES technique and stimulate the application of DNS/LES for engineering interest, AFOSR sponsored the DNS/LES international conference. The first conference was held in August 1997 in Louisiana Tech University, Ruston, LA. The written papers were published in *Advances in DNS/LES*, Greyden Press, edited by C. Liu, Z. Liu and L. Sakell.

This AFOSR sponsored conference and proceedings have significantly promoted the DNS/LES research and encouraged CFD researchers to use DNS/LES for engineering applications.

2 CONFERENCE TOPICS

- DNS/LES toward understanding fundamental flow physics
- DNS/LES for complex flows
- DNS/LES for flow transition
- DNS/LES for fully developed turbulent flow
- DNS/LES for aeroacoustics
- DNS/LES for heat transfer applications
- DNS/LES for combustion applications
- LES for atmospheric boundary layers
- DNS/LES for engineering applications
- DNS/LES for transition and turbulence modeling
- Development on filter and subgrid model for LES
- Boundary condition treatment for DNS/LES
- Numerical algorithm developments for DNS/LES
- Parallel computation implementations/applications for DNS/LES

3 INVITED SPEAKERS:

We supported 18 well-known invited speakers: N.A. Adams, J. Chasnov, H. Fasel, T. Herbert, K. Horiuti, K. Jansen, G. Karniadakis, A. Johansson, R. Joslin, M. Lesieur, R. Mankbadi, Y. Miyake, F. Nieuwstadt, U. Piomelli, H. Reed, P. Spalart, C. Streett, Z. Zhang.

4 STUDENT SUPPORT:

We provide 8 scholarships to support graduate students to attend the conference.

5 SCIENTIFIC COMMITTEE:

- Liu, Chaoqun, Chair (Louisiana Tech)
- Sakell, Len, Co-Chair (AFOSR)

- Chasnov, Jeff (Hong Kong)
- Fasel, Hermann (University of Arizona)
- Herbert, Thorwald (Ohio State University)
- Jansen, Kenneth (RPI)
- Johansson, Arne (Sweden)
- Joslin, Ronald (NASA Langley Research Center)
- Karniadakis, George (Brown University)
- Knight, Doyle (Rutgers University)
- Lesieur, Marcel (France)
- Lin, San-Yih (ChengKung University)
- Liu, Zhining (Louisiana Tech)
- Mankbadi, Reda (Egypt)
- Miyake, Yutaka (Japan)
- Nieuwstadt, Frans (Netherlands)
- Piomelli, Ugo (University of Maryland)
- Povinelli, Lou (NASA Lewis Research Center)
- Reed, Helen (Arizona State University)
- Shang, Joe (Wright-Patterson AFB)
- Strett, Craig (NASA Langley Research Center)
- Zhang, Zhaoshun (China)

6 CONFERENCE SPENDING REPORT

The support from AFOSR is \$21,000 and the real spending is listed as follows:

Travel expenses for invited speakers :	\$10,000
Advertizement :	\$3,000
Proceedings:	\$6,000
Materials :	\$1,000
Phones and fax:	\$ 500
Support for student participants :	\$5,000
Secretarial support :	\$3,000
Food and Drinks:	\$1,500
Total expenses :	\$30,000
Registration fees collected :	-\$9,000
AFOSR support :	-\$21,000
Balance	\$0