

# ERCOFTAC/IUTAM Summerschool

## on Turbulence and Transition Modelling

at Royal Institute of Technology, Stockholm 12 – 20 June, 1995

Arranged by the Swedish ERCOFTAC Pilot Center.  
*Organized with the support of COMETT and IUTAM.*

### *First Announcement*

#### **Aim of the Course**

The objective of the summer school is to spread knowledge of modelling tools to prospective users in industry and also to be of use to graduate students and researchers needing to apply transition and turbulence models in their scientific work.

#### **Contents**

The summerschool consists of three parts. The first two parts are primarily intended as an introduction to basic as well as advanced transition and turbulence modelling. The participants may be graduate students or researchers/engineers from industry or research institutes. The last part is intended for those who are currently involved in research on model development or are advanced users of models.

Tutorials (June 12-13) during which the basic physics and characteristic features of turbulence and transition and the basic theory and most widely used tools in modelling turbulence and transition will be introduced. This part is given by Prof. P.H. Alfredsson, Dr. A.D. Burden, Dr. M. Hallbäck, Prof. D.S. Henningson and Prof. A.V. Johansson at the Department of Mechanics. It will also include two visits to the fluid dynamics laboratory for demonstrations of experiments relevant to the theme of the summer school.

Lectures (June 14-16) on ‘the state of the art’ of various approaches to the modelling problems such as LES and RST. Also PSE as a transition prediction tool will be treated. Six leading researchers within the summer school topics will give these lectures.

Workshop (June 19-20) with contributed papers on the topics of turbulence and transition modelling. A few simple test cases will be discussed.

#### **Topics of invited lectures**

*Prof. B.E. Launder* (U.M.I.S.T., Manchester):

Reynolds stress transport modelling, particularly concerning near-wall treatment, exemplified through application to problems with laminarization (and/or transition).

*Dr. T.-H. Shih* (NASA Lewis, Ohio):

Realizability of turbulence models. Turbulence constitutive relationships – explicit algebraic Reynolds stress models. Scalar transport modelling.

*Prof. J. Chasnov* (Hongkong Univ. of Science & Techn.):

Subgrid modelling. Backscatter. Large Eddy Simulation applied to turbulent flows.

*Dr. F. Bertolotti* (DLR Göttingen):

Methods based on Parabolized Stability Equations (PSE). Non-linear effects.

*Prof. U. Piomelli* (Univ. of Maryland):

Large Eddy Simulation. Applications: transition, channel flow, backwards facing step etc.

*Dr. M. Savill* (Cambridge University):

RST and transport equation models applied to transition. Effects of free-stream turbulence.

### **Testcases during the workshop**

- A turbulent wall jet.
- Influence of free-stream turbulence on boundary layer transition.
- Turbulence near a shearfree solid wall boundary and/or free-surface boundary.
- Transition prediction in a 3D boundary layer.

The test cases will be defined and discussed with the potential participants and will be handed out to participating groups from December 15 1994 and on.

### **Course notes**

Course notes will be prepared by the lecturers and distributed to the participants. These notes represent a comprehensive review and useful reference material. The course notes will also be edited and published by Kluwer.

### **Registration**

The registration fee amounts to SEK 3.500. This includes lunches and refreshments as well as the course notes. For participants not attending the tutorial part or the workshop there is a 500 SEK reduction for each part. There is a 50% discount of the fee for student participants. Participants are advised to register before April 1 1995. The number of participants is limited to approximately 50. Further information about registration, payment instructions and accommodation etc can be obtained from the organizers.

### **Organizing committee**

The organizing committee consists of Prof. P.H. Alfredsson, Dr. M. Hallbäck, Prof. D.S. Henningson (also at FFA) and Prof. A.V. Johansson at the Department of Mechanics, KTH.

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