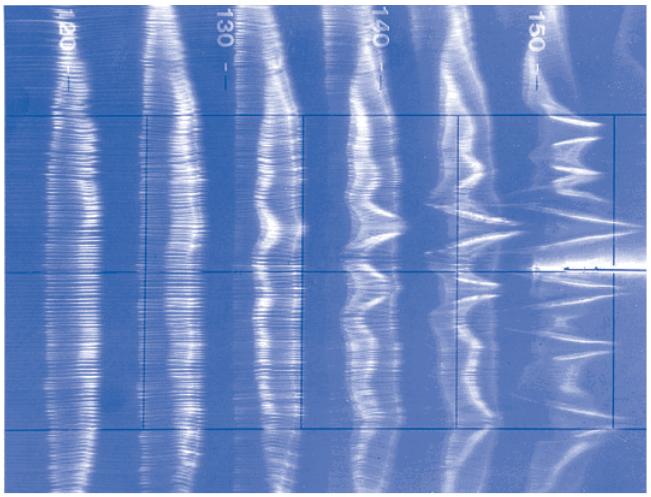
Lecture Series Secretary
von Karman Institute for Fluid Dynamics
72 Chaussée de Waterloo
B-1640 Rhode-St-Genèse
Belgium

von KARMAN INSTITUTE
FOR FLUID DYNAMICS

VKI LECTURE SERIES

ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING



January 12-15, 2009
Location:
Wright State University (Ohio, USA)

WRIGHT STATE
UNIVERSITY

We wish to thank the following for their contribution to the success of this conference: European Office of Aerospace Research and Development, Air Force Office of Scientific Research, United States Air Force Research Laboratory
http://www.london.af.mil

INTRODUCTION

Accurate modeling of the laminar-turbulent transition process remains a fundamental issue for the detailed description of the flow around wings, aircraft bodies and control surfaces, as well as for prediction of air vehicles drag, control surfaces effectiveness, and aerodynamic noise generation.

AGARD/FDP Lecture Series have been held at the VKI on flow stability and transition in 1984 and 1993 The purpose of this VKI-RTO/AVT Lecture Series is to revisit the subject in view of the latest advances made in these last fourteen years and their potential on aircraft design, specially taking into account the increased capabilities in numerical simulations and in non-intrusive optical measurement techniques, allowing detailed use of DNS data or of experimental data to understand more deeply the turbulent transition mechanisms, as a necessary prerequisite for a more accurate modeling.

The topics to be covered include a broad view of stability theory and different transition phenomena and scenarios. Subjects include receptivity of boundary layer to disturbances, by-pass mechanisms which anticipate transition, growth of 3D instabilities and their breakdown mechanisms, progress in parabolized Navier Stokes methods, and transition prediction and control.

The current course has been previously delivered at the von Karman Institute in June 2008. We wish to acknowledge the RTO financial support of the original series. The director of this VKI Lecture Series is Prof. William S. Saric from Texas A&M University, Prof. Guillermo Paniagua of the von Karman Institute will act as coordinator.

HOW TO REGISTER

Register by contacting the VKI secretariat (e-mail: secretariat@vki.ac.be). The registration deadline is the 5th of January 2009. A letter of acceptance and additional information will be sent on receipt of the application form available on the back of this announcement.

PRACTICAL INFORMATION

Lunches are scheduled from 12h30 to 14h00. Hot lunches are sponsored by Cradle North America. Two coffee breaks are programmed, in the morning at 10h45 and at 15h15 in the afternoon.

CRADLE

The afternoon sessions will normally finish at about 17h00.

On Monday12th of January all participants are invited to a reception dinner 6pm-to 8pm. Dr. Joseph Shang will deliver a talk on “A glance back and outlook of computational fluid dynamic research”. The reception dinner will take place at in the Apollo room at the Student Union.

TIMETABLE

MONDAY 12 JANUARY 2009

8:20 AM **Registration**

9:00 AM **Welcome, introductory remarks**
J. Bantle, Wright State University, USA
Dr. William S. Saric, Texas A&M, USA

9:15 AM **Paths to transition and introduction to linear stability**
Dr. Eli Reshotko, CWRU; Dr. William Saric, Texas A&M, USA

11:15 AM **Experiments in 2-D boundary layers: stability and receptivity**
Dr. William S. Saric, Texas A&M, USA

2:00 PM **Parabolized stability equations: 2-D flows**
Dr. Helen Reed

3:45 PM **Direct numerical simulation of stability and transition: 2-D flows**
Dr. Helen Reed

TUESDAY 13 JANUARY 2009

9:00 AM **Transient growth of disturbances: methodology and examples**
Dr. Eli Reshotko

11:00 AM **Practical transition prediction methods - I: Subsonic and transonic flows (1)**
Dr. Daniel Arnal, ONERA, Toulouse, France

2:00 PM **Practical transition prediction methods – II: Subsonic and transonic flows**
Dr. Daniel Arnal

3:45 PM **Experiments in 3-D boundary layers**
Dr. William S. Saric

WEDNESDAY 14 JANUARY 2009

9:00 AM **Leading edge and surface imperfection problems**
Dr. Daniel Arnal

11:00 AM **Supersonic experiments in boundary layers**
Dr. William S. Saric

2:00 PM **Computational methods for 3-D and supersonic flows**
Dr. Helen Reed

3:45 PM **Roughness induced transition: transient growth in 3-D and supersonic flows**
Dr. Eli Reshotko

THURSDAY 15 JANUARY 2009

9:00 AM **Role of chemical reactions in hypersonic flows**
Dr. Helen Reed

11:00 AM **Control of transition – I: Heating and cooling**
Dr. Eli Reshotko

2:00 PM **Control of transition – II: NLF, LFC, HLFC**
Dr. Daniel Arnal

3:45 PM **Practical transition prediction methods – III: Supersonic flows**
Dr. Eli Reshotko

METHODS OF PAYMENT

The payment should be done two weeks prior to the beginning of the course. Only two methods of payment are accepted:

1.By bank transfer to the VKI bank account.
(IBAN: BE57 2100 3153 3035; SWIFT CODE: GEBABEBB 36A)
Agency of the Fortis Bank, avenue de la Forêt de Soignes 322, 1640 Rhode Saint Genese, Belgium.
The name of the participant and the title of the Lecture Series must be clearly indicated.

2. Or by returning a copy of this invoice with the following information to the VKI administrative office (e-mail: vanhaelen@vki.ac.be, FAX: +32 2 359 96 00):

Name of participant: . . . . . .

Title of the Lecture Series: . . . . . .

Charge to:

☐ Visa

☐ MasterCard

☐ AMEX

☐ DinersClub

For an amount of . . . . . .USA Dollars
Card holder: . . . . . .
Number: . . . . . .
Expiration date: ..../.....
Security Pin (3digits) : . . . . . .

Signature: . . . . . .

HOTEL INFO

Holiday Inn Dayton/Fairborn
http://www.whihotels.com/ebrochures/hifairborn/index.shtml

To ensure reservation at a special rate, participants are advised to make hotel reservations before the 2nd of January 2009, mentioning "WSU-VKI Lecture Series". A block of guest rooms are held out for this event.

The guest room rate for the event is $89.00 and are available to the Lecture Series participants by either calling 937-426-7800 or asking for the "WSU-VKI Lecture Series" or they can email directly the hotel at kris.davis@hidaytonfairborn.com

APPLICATION FOR ADMISSION TO VKI LECTURE SERIES

Lecture Series Title: ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING.....

☐ Mr ☐ Mrs
Family name: . . . . . .Firstname: . . . . . .Nationality: . . . . . .
Name & full address of organisation, institution or university: . . . . . .
Phone nr: . . . . . .Fax nr: . . . . . .
Position or title: . . . . . .E-mail: . . . . . .

☐ Asking a reduced fee and joining a recommendation letter as: ☐ undergraduate student ☐ Ph.D. candidate or University assistant
Company / University VAT number: . . . . . .
VAT of the von Karman Institute: BE 0407 185 709

Please indicate any special needs (e.g. vegetarian, ...):
. . . . . .

Date: . . . . . .Signature: . . . . . .

Please mail under-cover to VKI

Programme

LECTURE SERIES
2008-2009

VKI LS

- ☐ INTRODUCTION TO CFD
  (12-16 January 2009)
- ☑ ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING
  (12-15 January 2009 - at the Wright State University, Ohio, USA)
- ☐ RECENT ADVANCES IN PARTICLE IMAGE VELOCIMETRY
  (26-30 January 2009)
- ☐ MODELING AND COMPUTATION OF NANOPARTICLES IN FLUID FLOWS (RTO-AVT-VKI)
  (9-12 February 2009)
- ☐ FLOW CONTROL: FUNDAMENTALS, ADVANCES AND APPLICATIONS
  (2-6 March 2009)
- ☐ AERODYNAMIC NOISE FROM WALL-BOUNDED FLOWS
  (9-13 March 2009)
- ☐ LIQUID FRAGMENTATION IN HIGH-SPEED FLOW
  (16-18 March 2009)
- ☐ NUMERICAL INVESTIGATIONS IN TURBOMACHINERY: THE STATE OF THE ART
  (20-24 april 2009)
- ☐ HIGH PERFORMANCE COMPUTING OF INDUSTRIAL FLOWS
  (5-7 May 2009)
- ☐ ADVANCED HIGH TEMPERATURE INSTRUMENTATION FOR GAS TURBINE APPLICATIONS
  (11-14 May 2009)
- ☐ TURBULENT COMBUSTION
  (25-29 May 2009)
- ☐ 36TH CFD.ADIGMA COURSE ON VERY HIGH ORDER DISCRETIZATION METHODS
  (June 8-12, 2009)

OTHER CONFERENCES:

- ☐ PHYSMOD 2009: INTERNATIONAL WORKSHOP ON PHYSICAL MODELLING OF FLOW AND DISPERSION PHENOMENA
  (24-26 August 2009)
- ☐ 4TH SYMPOSIUM ON INTEGRATION CFD AND EXPERIMENTS IN AERODYNAMICS
  (7-9 September 2009)

REGISTRATION FEE

The course fee of $1000 includes administrative costs, printed notes, lunches, coffee, and a reception dinner.

Under a special arrangement, the registration fee will be waived to Air Force personnel and Wright State University participants.

FELLOWSHIPS

To encourage greater participation in our Lecture Series programme by university members, a limited number of fellowships will be made available. The recipient of a fellowship is entitled to attend the Lecture Series at a reduced fee, which will be of $600 for assistants not having a Ph.D. degree and for Ph.D. candidates, or $300 for undergraduate students. The fee is applicable for all NATO citizens.

The request to be considered for an award must accompany the application to attend the Lecture Series, and the applicant must provide a recommendation letter from his or her professor; if not done so, the request will not be taken into consideration.

All possible alternative sources of funding should be investigated before aid is requested under this scheme, so that those most in need will benefit.

ASME DAYTON SECTION

AIAA Dayton-Cincinnati

PROCEEDINGS

Printed notes will be distributed during registration.

Proceedings of other VKI Lecture Series may be purchased at VKI (e-mail: vanhaelen@vki.ac.be). Information can be found on the VKI web site http://www.vki.ac.be.

LOCATION AND TRANSPORT

The Lecture Series will take place at the Wright State University, at the room 158 RC. Wright State University is located in Dayton, Ohio, approximately 70 miles west of the state capital, Columbus. Air transportation is provided by several major airlines to Dayton International Airport, located about 25 minutes from the campus. Ground transportation to campus from the airport is provided by rental car, taxi, or limousine service. Dayton is served by interstate highways 70 and 75, which intersect just north of the city. Details on how to reach the conference hall from the Hotel Holiday Inn are provided in the enclosed map.