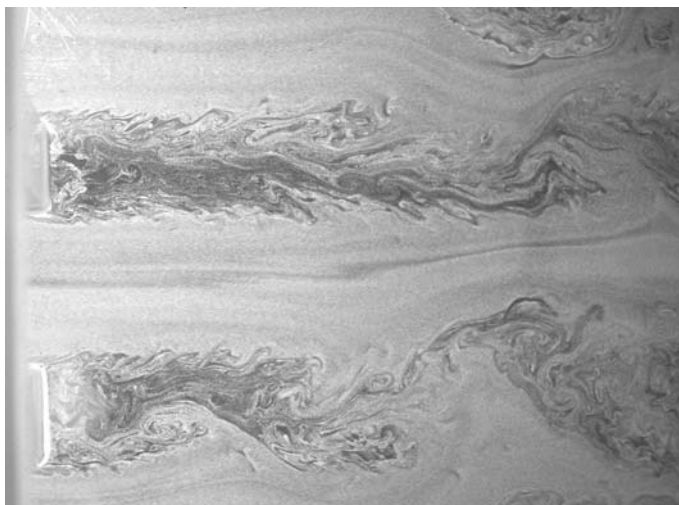




von KARMAN INSTITUTE FOR FLUID DYNAMICS

ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING

RTO - AVT / VKI LECTURE SERIES



June 9-12, 2008

In collaboration with the RTO



**NATO RESEARCH AND
TECHNOLOGY ORGANIZATION**

von Karman Institute for Fluid Dynamics
72, Chaussée de Waterloo
1640 Rhode-Saint-Genèse, Belgium

Phone: +32(0)2 359 96 04 - Fax: +32(0)2 359 96 00
E-mail: secretariat@vki.ac.be, TVA BE 0407 185 709
Website: <http://www.vki.ac.be>

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 RTO-AVT/VKI 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 director of this RTO-AVT/VKI Lecture Series is Prof. William S. Saric from Texas A&M University, and Prof. Mario Carbonaro of the von Karman Institute will act as local coordinator.

TIMETABLE

MONDAY JUNE 9, 2008

- 09:00** **Welcome address**
Prof. Mario Carbonaro, von Karman Institute, Belgium
- 09:15** **Paths to Transition and Introduction to Linear Stability**
Prof. Eli Reshotko, CWRU, USA & Dr. William Saric, Texas A&M, USA
- 11:15** **Experiments in 2-D boundary layers: stability and receptivity**
Prof. William Saric
- 14:00** **Parabolized stability equations: 2-D flows**
Prof. Helen Reed, Texas A&M, USA
- 15:45** **Direct numerical simulation of stability and transition: 2-D flows**
Prof. Helen Reed
- 17:00** **Reception**

TUESDAY JUNE 10, 2008

- 09:00** **Transient growth of disturbances: methodology and examples**
Prof. Eli Reshotko
- 11:00** **Practical transition prediction methods -I: subsonic and transonic flows**
Dr. Daniel Arnal, ONERA, Toulouse, France
- 14:00** **Practical transition prediction methods -II: subsonic and transonic flows**
Dr. Daniel Arnal

- 15.45** **Experiments in 3-D boundary layers**
Prof. William Saric

WEDNESDAY JUNE 11, 2008

- 09:00** **Leading edge and surface imperfection problems**
Dr. Daniel Arnal
- 11:00** **Supersonic experiments in boundary layers**
Prof. William Saric
- 14:00** **Computational methods for 3-D and supersonic flows**
Prof. Helen Reed
- 15:45** **Roughness induced transition: transient growth in 3-D and supersonic flows**
Prof. Eli Reshotko

THURSDAY JUNE 12, 2008

- 09:00** **Role of chemical reactions in hypersonic flows**
Prof. Helen Reed
- 11:00** **Control of transition – I: heating and cooling**
Prof. Eli Reshotko
- 14:00** **Control of transition – II: NLF, LFC, HLFC**
Dr. Daniel Arnal
- 15:45** **Practical transition prediction methods – III: supersonic flows**
Prof. Eli Reshotko
- 17:00** **VKI bus departure**

PRACTICAL INFORMATION

Lunch will be taken from 12h30 to 13h45. Coffee breaks are scheduled each morning and afternoon. The afternoon sessions will normally finish at about 17h00.

*Please pass this announcement
to someone who may be interested
if you are unable to attend
the Lecture Series yourself*



- ☐ BASICS OF AERO-ACOUSTICS AND THERMO-ACOUSTICS
(3-7 DECEMBER 2007)
- ☐ INTRODUCTION TO CFD
(28 JANUARY-1 FEBRUARY 2008)
- ☐ POST-PROCESSING OF NUMERICAL & EXPERIMENTAL DATA
(11-15 FEBRUARY 2008)
- ☐ EXPERIMENTAL DETERMINATION OF DYNAMIC STABILITY PARAMETERS
(18-22 FEBRUARY 2008)
- ☐ AEROENGINE DESIGN: FROM STATE OF THE ART TURBOFANS TOWARDS INNOVATIVE ARCHITECTURES
(3-7 MARCH 2008)
- ☐ LARGE EDDY SIMULATION AND RELATED TECHNIQUES. THEORY AND APPLICATIONS
(10-14 MARCH 2008)
- ☐ STRUCTURAL DESIGN OF AIRCRAFT ENGINES - KEY OBJECTIVES AND TECHNIQUES
(13-16 MAY, 2008)
- ☐ ATMOSPHERIC BOUNDARY LAYER FLOWS IN AIR POLLUTION MODELLING
(19-23 MAY 2008)
- ☐ INTRODUCTION TO OPTIMIZATION METHODS AND TOOLS FOR MULTIDISCIPLINARY DESIGN IN AERONAUTICS AND TURBOMACHINERY
(2-6 JUNE 2008)
- ☒ ADVANCES IN LAMINAR-TURBULENT TRANSITION MODELING (RTO-AVT/VKI)
(9-12 JUNE 2008)
- ☐ NON-EQUILIBRIUM GAS DYNAMICS, FROM PHYSICAL MODELS TO HYPERSONIC FLIGHTS (RTO-AVT/VKI)
(8-12 SEPTEMBER 2008)
- ☐ 35TH CFD / ADIGMA COURSE ON VERY HIGH ORDER DISCRETIZATION METHODS
(13-17 OCTOBER 2008)

OTHER CONFERENCES:

- ☐ XIX BIENNIAL SYMPOSIUM ON MEASURING TECHNIQUES IN TURBOMACHINERY
(7-8 APRIL 2008)

COURSE FEE

The course fee of 890 € includes printed notes, transport between VKI and the recommended hotels, lunches, beverages, and administrative costs. The prices include VAT (21%).

FELLOWSHIPS

To encourage greater participation in our Lecture Series programme by university members, the Institute has established a limited number of VKI Lecture Series fellowships for citizens of NATO countries contributing to the financing of the VKI, as well as for citizens of other NATO countries coming from a university in a VKI financing country. The recipient of a fellowship is entitled to attend the VKI Lecture Series at a reduced fee, which will be 595 € (VAT included) for assistants not having a Ph.D. degree and for Ph.D. candidates, or 295 € (VAT included) for undergraduate students. 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.

METHODS OF PAYMENT

Payment 2 weeks prior to the beginning of the course (name and course title clearly indicated) by bank transfer to our account Nr 210-0315330-35 at Fortis Bank, avenue de la Forêt de Soignes 322, 1640 Rhode-Saint-Genèse, Belgium, IBAN BE57 2100 3153 3035 (strongly recommended). SWIFT BIC GEBA BE BB.

Late registration can be paid in cash (EURO), or by VISA or Eurocard at the beginning of the course.

PROCEEDINGS

Lectures will be given in English and printed notes will be distributed during registration. Proceedings of other non-RTO lecture series may be purchased at VKI (by e-mail: vanhaelen@vki.ac.be or by fax : 32 2 359 96 00). Information can be found on <http://www.vki.ac.be>.

HOW TO REGISTER

It is highly recommended that the registration/hotel reservation form be sent at the latest 15 days before the beginning of the course. A letter of acceptance and additional information will be sent on receipt of the application form.

ACCOMMODATION & TRANSPORT

Participants are advised to make their reservations as early as possible. VKI secretariat (secretariat@vki.ac.be) can book rooms upon request in the recommended hotels listed below. Daily rates include all charges and continental breakfast. These prices could be subject to changes.

Hôtel des Colonies http://www.hotel-des-colonies.com	Single: 110 € / Double: 130 €
Hôtel Vendôme http://www.hotel-vendome.be	Single: 100 € / Double: 130 €
Thon Hotel Brussels City Centre http://www.thonhotels.be/	Single: 135 € / Double: 165 €
Hôtel Le Dôme http://www.hotel-le-dome.be	Single: 120 € / Double: 140 €
Hôtel Orts http://www.hotelorts.com	Single: 200 € / Double: 250 €
Progress Hôtel http://www.progresshotel.be	Single: 200 € / Double: 220 €

However, participants could occasionally find special offers on hotel websites.

At youth hostel, the Sleepwell, is within walking distance of the recommended hotels. We invite you to make your own reservation through their website: <http://www.sleepwell.be>.

The hotels situated in Brussels are all within walking distance from the Gare du Nord and the Place Rogier. A train service links the airport with the Gare du Nord (15' journey). Complete your journey to the hotel/youth hostel on foot or by taxi. Each morning and evening, bus transport will be provided between the Place Rogier and the von Karman Institute, located in Rhode-Saint-Genèse, a suburb south of Brussels.

The following hotel, which is about 1.5 km from the Institute, is also recommended, particularly for those who travel by private car. The hotel is about 12km from the center of Brussels and a high standard of comfort is assured.

Auberge de Waterloo****
e-mail: aubergedewaterloo@skynet.be
Fax : +32 (0)2 358 38 06 - Tel: +32 (0)2 358 35 80
Chaussée de Waterloo 212 -
1640 Rhode-Saint-Genèse

For more information about the location of the Institute and the hotels, please visit our website on <http://www.vki.ac.be>.