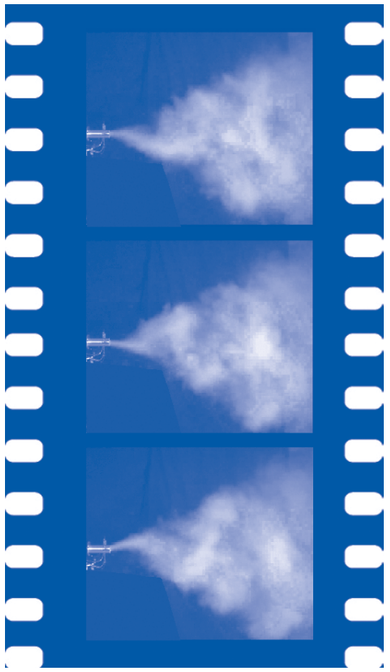
Please correct your address if necessary)

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

FLOW CONTROL: FUNDAMENTALS, ADVANCES AND APPLICATIONS



March 2-6, 2009

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

Flow control is a key issue for the improvement of the next generation of airplanes, cars and energy generation for a safe and clean environment.

The purpose of this Lecture Series is to present the state-of-the-art review of on-going activities in flow control and to indicate current research directions, in a way accessible to attendees coming from both academic and industrial areas.

The course week will start with the fundamentals of fluid mechanics, turbulent characteristics of flows in view of control, stability and control theories. The recent advances in control strategies, sensors and actuators for closed loop will then be presented, including low energy plasmas for flow control. Illustrations of successful control for industrial situations, transition, drag reduction, flow separation, cavity and jet noise and combustion will be discussed to enhance the applicability to the various fields of research of the attendees.

The main objective of this course is therefore to allow an information transfer between well-known scientists, leaders in the flow control field, and demanding industries and laboratories. For these reasons, the course should appeal not only to experts already working in the domain, but also to newcomers to the field.

The Lecture Series director is Prof. J.-P. Bonnet from University of Poitiers, ENSMA, CNRS, France and the local coordinator is Prof. J. Anthoine from the von Karman Institute for Fluid Dynamics, Belgium.

TIMETABLE

MONDAY MARCH 2

08:45 Welcome address
09:15 Introduction and fluid mechanics for flow control
J.-P. Bonnet, University of Poitiers, ENSMA, CNRS, France

11:00 Stability for flow control
W.S. Saric, Texas A&M University, USA

14:00 Reduced-order models
L. Cordier, University of Poitiers, ENSMA, CNRS, France

15:45 Optimal control
L. Cordier

17:00 Reception

TUESDAY MARCH 3

09:00 Control strategies, actuators and sensors
L. Cattafesta, University of Florida, USA

10:45 Control strategies (Continued)
L. Cattafesta

14:00 Plasmas for flow control
E. Moreau, University of Poitiers, ENSMA, CNRS, France

15:45 Industrial constraints and requirements for aeronautical flow control applications
J.C. Courty, Dassault Aviation, France

WEDNESDAY MARCH 4

09:00 Closed loop strategies
R. King, Technische Universität Berlin, Germany

10:45 Closed loop strategies (Continued)
R. King

14:00 Visit to the VKI laboratories

15:30 VKI bus departure

THURSDAY MARCH 5

09:00 Control of transition
W.S. Saric

10:45 Drag reduction
K.-S. Choi, University of Nottingham, UK

14:00 Control of flow separation
L. Cattafesta

15:45 Cavity flows
L. Cattafesta

FRIDAY MARCH 6

9:00 Jet noise control
P. Jordan, University of Poitiers, ENSMA, CNRS, France

10:45 Control of combustion instabilities
A. Morgans, Imperial College London, UK

14:00 VKI bus departure

PRACTICAL INFORMATION

Each lecture lasts for 75 minutes. Coffee breaks are organized between 10:15 and 10:45 (except Monday morning between 10:30 and 11:00) and between 15:15 and 15:45. Lunch is organized between 12:00 and 14:00 (except Monday between 12:30 and 14:00).

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

VON KARMAN INSTITUTE FOR FLUID DYNAMICS

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
  (14-16 September 2009)

COURSE FEE

The fee for the lecture series is 1300 euro, applicable to citizens of NATO countries contributing to the financing of the VKI (Belgium, Czech Republic, France, Germany, Hungary, Iceland, Italy, Luxemburg, Norway, Portugal, Spain and Turkey). For citizens of other NATO countries and of NATO partner countries, the fee is 1700 euro. For non-NATO citizens the fee is of 1850 euro. These prices include 21% VAT.

The fee includes printed notes, transport between VKI from and to the recommended hotels in the center of Brussels, lunches, beverages, and administrative costs.

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 such fellowship is entitled to attend the Lecture Series at a reduced fee, which will be of 650 euro (VAT included) for assistants not having a Ph.D. degree and for Ph.D. candidates, or 300 euro (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 GEBABEBB.

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

Hôtel des Colonies http://www.hotel-des-colonies.com	Single: 120 € / Double: 140 €
Hôtel Vendôme http://www.hotel-vendome.be	see the website
Hôtel Marivaux http://www.marivaux.be	see the website
Thon Hotel Brussels City Centre http://www.thonhotels.be/	Single: 142 € / Double: 174 €
Hôtel Le Dôme http://www.hotel-le-dome.be	Single: 125 € / Double: 145 €
Progress Hôtel http://www.progresshotel.be	Single: 200 € / Double: 220 €

A 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 Place Rogier. A train service links the airport with the Gare du Midi. Complete your journey to the hotel/youth hostel 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 hotels are also recommended, particularly for those who travel by private car.

Auberge de Waterloo****
Chaussée de Waterloo 212 - 1640 Rhode-Saint-Genèse
Tel: +32 (0)2 358 35 80 - Fax : +32 (0)2 358 38 06
http://www.aubergedewaterloo.be
(*1single room: +/- 106€*)

Gravenhof Hotel
Alsembergsesteenweg 616 - B-1653 Dworp
Tel: +32 2 380 44 99 - Fax: +32 2 380 40 60
http://www.gravenhof.be
(*1 single room: +/- 105 €, breakfeast not included*)

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

APPLICATION FOR ADMISSION TO VKI LECTURE SERIES

Lecture Series Title: FLOW CONTROL: FUNDAMENTALS, ADVANCES AND APPLICATIONS .....

☐ Mr ☐ Mrs
Family name: ..... Firstname: .....
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

HOTEL RESERVATION *(if applicable)*

I require accommodation at Hotel ..... for ..... person(s)
Single: ..... Double: ..... Date of arrival: .....
I shall require transport to and from the Institute ☐ ☐ Date of departure: .....
I do not require transport to and from the Institute ☐ ☐
Please indicate any special needs (e.g. vegetarian, ...): .....

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

Please mail under -cover to VKI