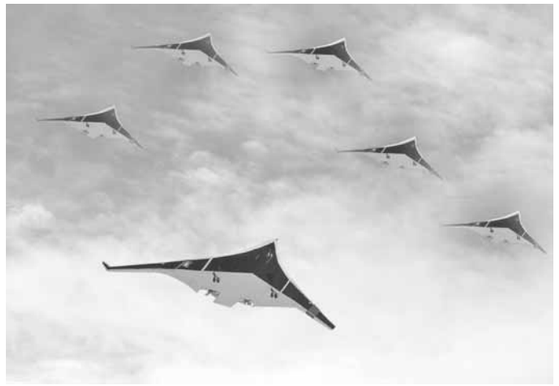
Please correct your address if necessary)

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



Introduction to Optimization Methods and Tools for Multidisciplinary Design in Aeronautics and Turbomachinery

June 2-6, 2008

This course is realized with the support of the Scientific Research Community on Numerical Methods for Mathematical Modelling of FWO Flanders

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Website: http://www.vki.ac.be

INTRODUCTION

Innovative optimisation and design techniques for modern aircraft (manned or UAV/UCAV) and engine systems aiming at maximum performance in multidisciplinary context (aerodynamic efficiency, safety, drag, losses, weight, strength, heat fluxes, emission, noise, …), are now rapidly moving from research labs to industrial real and virtual platforms. To reach concurrently this level of excellence, emergent optimization methodologies require more and more robust and efficient associated software for a daily use in industrial collaborative design environments.

This course intends to provide the basic concepts and tools behind this technology, both in single discipline (single point or multi point design) and multidisciplinary (fluid-structure interaction, fluid-acoustics, conjugate heat transfer, …) context. Subjects which will be treated in detail include: gradient based and steepest descent methods, adjoint methods, one shot or goal oriented methods, optimal control, evolutionary/differential evolution algorithms on parallel environments, game strategies like Pareto Fronts and Nash Equilibrium, parameterization, approximation methods (Radial Basis functions, Artificial Neural Networks, Kriging techniques …), distributed and collective design, collaborative optimization, robust design, self organizing map techniques, …

The content of this Course is oriented towards junior and experienced engineers and researchers involved in the field of multi disciplinary design and looking for innovative numerical solutions - or set of solutions- for complex multi criteria optimization problems.

The Lecture Series directors are Prof. J. Périaux, of CIMNE/Univ. Politecnica de Catalunya and Prof. H. Deconinck of the von Karman Institute.

TIMETABLE

MONDAY JUNE 2, 2008

09:15 **Welcome address**
M. Carbonaro, von Karman Institute for Fluid Dynamics, Belgium

09:30 **Optimal shape design: formulation and theoretical foundations (1)**
Prof. O. Pironneau, Univ. P&M Curie, France

11:15 **Distributed multidisciplinary design and collaborative optimization**
Prof. I. Kroo, Stanford University, USA

14:00 **Theoretical background for aerodynamic shape optimization**
Dr. J. Vassberg, The Boeing Company, USA

15:45 **Adjoint approaches in MDO context: fundamentals (1)**
Dr. N. Gauger, HU Berlin and DLR Braunschweig, Germany

17:00 **Reception**

TUESDAY JUNE 3, 2008

09:00 **Optimal shape design: results and applications (2)**
Prof. O. Pironneau

10:45 **Adjoint approaches in MDO context: Single- and multi physics applications in aeronautics (2)**
Dr. N. Gauger

14:00 **Collectives and complex system design**
Prof. I. Kroo

15:45 **Single and multiple objective optimization with differential evolution and neural networks (1)**
Dr. M. Rai, NASA Ames, USA

WEDNESDAY JUNE 4, 2008

09:00 **Multi objective optimization (MOO) methods for multidisciplinary design using parallel evolutionary algorithms, game theory and hierarchical topology: theoretical background (1)**
Prof. J. Périaux, CIMNE/UPC Barcelona , Spain

10:45 **Towards robust design via multiple objective optimization method (2)**
Dr. M. Rai

14:00 **Metamodel assisted, hierarchical and distributed evolutionary algorithms: theoretical aspects (1)**
Prof. K. Giannakoglou, NTUA, Greece

15:45 **MOO methods for multidisciplinary design using parallel evolutionary algorithms, game theory and hierarchical topology: HAPEA software and tutorial with model optimization test cases (2)**
Dr. F. Gonzalez, QUT Brisbane, Australia

THURSDAY JUNE 5, 2008

09:00 **Industrial applications of aerodynamic shape optimization**
Dr. J. Vassberg

10:45 **MDO of turbomachinery components including heat transfer and stress predictions**
Dr. T. Verstraete & Prof. R. Van den Braembussche, VKI, Belgium

14:00 **Hybridized metamodel/gradient methods: applications to turbomachinery (2)**
Prof. K. Giannakoglou

15:45 **Processes & methodologies for multidisciplinary design in aeronautics**
Dr. V. Selmin, ALENIA

FRIDAY JUNE 6, 2008

9:00 **MOO methods for multidisciplinary design using parallel evolutionary algorithms, game theory and hierarchical topology: applications of design optimization of UAV systems (3)**
Dr. F. Gonzalez

10:45 **Robust design, approximation methods and self organizing map techniques for MDO problems. Applications in aeronautics and turbomachinery**
Prof. V. Pediroda & C. Poloni, Univ. of Trieste, Italy

14:00 **VKI bus departure**

PRACTICAL INFORMATION

Lunch will be taken from 12h30 to 14h00. Coffee breaks are scheduled each morning and afternoon.

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

Programme

LECTURE SERIES 2007-2008

VKI LS

- ☐ 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 MODELLING (RTO-AVT-VKI) (9-3 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 (Postponed, Date will be announced on the website http://www.vki.ac.be)

OTHER CONFERENCES:

- ☐ XIX BIANNUAL SYMPOSIUM ON MEASURING TECHNIQUES IN TURBOMACHINERY (7-8 April 2008)

COURSE FEE

The fee for the lecture series is 1180 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 of 1545 euro. For non-NATO citizens, the fee is of 1665 euro. The prices include VAT (21%). The fee includes printed notes, transport between VKI and to the recommended hotels, 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 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 BE.

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 ba 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.

APPLICATION FOR ADMISSION TO VKI LECTURE SERIES

Lecture Series Title: .....

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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