

IUTAM Symposium

on

UNSTEADY SEPARATED FLOWS AND THEIR CONTROL

June 18-22, 2007

Kerkyra (Corfu)¹, Greece

**Host Institution: Institut de Mécanique des Fluides de Toulouse,
Unité Mixte de Recherche UMR CNRS/INPT 5502, France**

Deadline for abstract submission : 30 August 2006

SYMPOSIUM's web site available soon:
www.imft.fr/actualites/iutam2007_imft/

View of the Kerkyra island :
¹<http://www.terrakerkyra.gr/>

TOPICS

This IUTAM Symposium concerns an important topic in Theoretical and Applied Mechanics nowadays. It aims at achieving a unified approach which will regroup the knowledge coming from theoretical, experimental, numerical simulation, modeling and flow-control aspects of separated unsteady flows with respect to incompressible and compressible flow regimes. The subject areas are receiving a great deal of impetus from international research groups, stimulated by major research programs related to this topic, involving major industrial companies especially in Aeronautics in various countries and by heading Government Programs. It aims to bring together the groups of researchers working on the problems related to the understanding and the prediction of unsteady, separated flows. This symposium is inspired from a previously held IUTAM symposium on unsteady separated flows in Toulouse, in 2002 by the present host Institution, a symposium that has been quite a success in the field. *The present IUTAM symposium is an essential extension of the topic to control theory and applications in respect of unsteady separated flows.* The symposium of 2007 will address physical aspects of the dynamics related to unsteady separation in incompressible flows and flows under compressibility effects, and the state of the art methods for modeling these kinds of flows in high Reynolds numbers. Special attention will be paid to control theory and applications, especially including feed-back effects for the attenuation of

unsteadiness and of flow separation. The understanding of the flow-physics and their efficient turbulence modeling remains a serious problem in a number of engineering applications, including Aeronautics and Aeroelasticity. Furthermore, the study of advanced flow modeling techniques, especially to control high-Reynolds number transitional and turbulent flows involving unsteady separation, is a crucial need in the above-mentioned domains of fundamental and applied research nowadays.

It is intended that people working in experimental investigation of unsteady separated flows, those working in the numerical simulation and turbulence modeling of these flows and those working in the domain of control theory should attend in order to stimulate the discussion in advancing the physical analysis of the related mechanisms and therefore to offer improvement in modeling and control of important unsteady phenomena arising in this class of flows. In this way, the symposium will contribute to a better insight of this important category of flows from a fundamental and applied research point of view by means of a synergy among the three main approaches: theoretical, experimental and prediction methods.

SCOPE

The main objectives on which focuses the present symposium are listed below:

- **Theoretical aspects of flow control**
- **Instability and Transition studies related to the onset of separation**
- **Experimental techniques for the dynamics of separation and its control**
- **Compressibility effects related to unsteady separation and its control**
- **Direct Numerical Simulation of unsteady separated flows**
- **Turbulence Modeling approaches adapted to the physics of unsteady separation; advanced statistical (URANS) and hybrid (URANS-LES) approaches**

DETAILED DESCRIPTION OF THE SYMPOSIUM THEME

The physical mechanisms related to the onset of unsteady separation and of its control are key features for the understanding of fundamental aspects related to the dynamics of the near wall region and for the suppression of nuisible effects related with the flow unsteadiness (noise, loss of lift, dip-flutter, buffeting phenomenon...). A thorough knowledge of the physical mechanisms involved in the unsteady separation is a prerequisite for the appropriate modeling of related flows, that have a crucial importance in major industrial applications. The reasons for the appearance of unsteady separation are due to inherently unsteady effects arising from the amplification of instabilities and to forcing factors responsible for creation of adverse pressure gradients, leading to detachment and to a roll-up process.

These effects are of major interest to be analyzed in the context of incompressible, subsonic, transonic and supersonic flow regimes. In particular, the influence of compressibility on unsteady separation will be of interest in the present symposium.

The effects of unsteady separation on the global and local parameters of the flow are of considerable interest in the mentioned domains and are directly linked to the kind of coherent structures formed downstream and to feedback mechanisms between the upstream and downstream

separation regions. The advances in the understanding of the physical mechanisms related to these unsteady phenomena are of great importance to achieve appropriate control methods to attenuate/inhibit the instability and the onset of turbulence. Advanced control methods will be examined in respect of their efficiency in attenuating/suppressing the unsteady separation, the flow-induced vibrations as well as the transonic regime unsteady phenomena related to buffeting and dip-flutter.

SCIENTIFIC COMMITTEE

Chair: Dr. **Marianna Braza**, IMFT/ CNRS, Institut de Mécanique des Fluides de Toulouse/Centre National de Recherche Scientifique, France, braza@imft.fr

Co-Chair: Prof. **Kerry Hourigan**, Mechanical Engineering, Development, Faculty of Engineering, Monash University, Clayton, Australia

Members:

Prof. **A. Bottaro**, Università di Genova, Facoltà di Ingegneria, Dipartimento di Ingegneria Genova, Italy

Prof. **Carlo Cercignani**, IUTAM Representative, Univ. of Milano, Italy

Prof. **Bernard J. Geurts**, Faculty of Mathematical Sciences, University of Twente, The Netherlands

Prof. **George E. Karniadakis**, Division of Applied Mathematics, Center for Fluid Mechanics, Turbulence and Computation, Brown University, Providence, USA

Dr. **Christoffer Norberg**, Division of Heat Transfer, Lund Institute of Technology, Lund, Sweden

Prof. **Frank Smith**, Faculty of Mathematics University College London, UK

Prof. **Frank Thiele**, Hermann-Föttinger-Institut für Strömungsmechanik, Technische Universität Berlin, Germany

Prof. **George Tzabiras**, Naval Architecture and Marine Engineering Dept., National Technical University of Athens, Athens, Greece

LOCATION

The location of the present symposium is associated with a long collaboration between the group EMT2/IMFT (*Ecoulements Monophasiques Transitionnels et Turbulents*)/Institut de Mécanique des Fluides de Toulouse) and the Naval Architecture and Marine Engineering Dept. of the National Technical University of Athens, that will steer the local organizing committee.

The practical aspects of the symposium organization are under the responsibility of Héliotopos Conferences:

<http://heliotospos.conferences.gr>

The registration, accommodation, symposium payment and social program will be handled by Heliotospos. The symposium registration web site will be available very soon.

The symposium location is associated with a very nice environment on the island of Kerkyra (Corfu) of Greece, at the prestigious hotel Chandris, in the Dassia area, by the sea. The gala dinner will be organized in the Achilleion Palace, originally built by the empress Elisabeth of Austria in the 19th century.

DOCUMENTS

Abstracts will be available at the beginning of the symposium, as well as a CD-Rom with the full papers.

After review, a number of selected papers will be edited in a dedicated volume edited by Kluwer.

ABSTRACT SUBMISSION

Extended abstracts should be submitted as a 2-pages . doc or .pdf file including figures to :

iutam07@imft.fr by 30 August 2006.

They are to be 2 pages in length, (Arial 10 size characters) inclusive of figures, and should have 3 centimetre margins around the text. They should comprise the title, authors, affiliation, address and E-mail address (a model MS-Word form will be downloadable from the web site).

Abstracts should be sent as attached files by E-mail only to : iutam2007@imft.fr

DEADLINES

Extended abstractAugust 30th, 2006
Letter of acceptance based on the abstract.....November 25th, 2006

Full paper.....February 28th, 2007

ACCOMMODATION

Participants are encouraged to book at the symposium hotel Chandris, by means of Heliotopos (special rates). Additionally, a list of neighbouring hotels will be available by Heliotopos. A limited number of Student fellowships will be available. Further information on the location and accommodation will be available on the Heliotopos web site and mailed to registered and pre-registered participants

LOCAL ORGANISING COMMITTEE

M. Braza	IMFT
P. Chassaing	IMFT
G. Harran	IMFT
A. Sevrain	IMFT
M. Sabater	IMFT
G. Martin	IMFT
D. Bourrel	IMFT
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K. Georgiou	NTUA
G. Tzabiras	NTUA
A. Zervos	NTUA

HOST INSTITUTION

The host Institution is the *Institut de Mécanique des Fluides de Toulouse* (IMFT), Unité Mixte de Recherche N° 5502, CNRS/INPT/UPS affiliated with: the French « Centre National de la Recherche Scientifique », the « Institut National Polytechnique de Toulouse » and the « Université Paul Sabatier ».

The symposium benefits from the general services of IMFT: Network and computing systems, (G. Martin), Signal-Image Processing (J.F. Alquier), Reprographics (M. Sabater), Numerical software (A. Stoukov), Administration (D. Bourrel) and Accounting services of ENSEEIHT and INPT.

SYMPOSIUM ADDRESS

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CONTACT

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