ECCOMAS SCHOOL

ECCOMAS
European Community on Computational Methods in Applied Sciences

About ECCOMAS

ECCOMAS is an organisation grouping European Associations with interests in the development and applications of computational methods in science and technology.
ECCOMAS was created in 1993 with the aim of fostering basic and applied research and dissemination of activities in Europe in the field of Computational Methods in Applied Sciences.
Its fields of interest are the applications of Mathematical and Computational Methods and Modelling to major areas such as Fluid Dynamics, Structural Mechanics, Semi-conductor Modelling or Electro-magnetics. Multidisciplinary applications of these fields to critical societal and technological problems encountered in sectors like Aerospace, Car and Ship Industry, Electronics, Energy, Finance, Chemistry, Medicine, Biosciences, Environmental sciences are of particular interest.

About the Center for Advanced Studies of Ibiza

The Center for Advanced Studies of Ibiza was created in 2005 by the *Consell Insular d'Eivissa i Formentera* with the aim of promoting research, training, dissemination, and technology transfer activities in scientific and technical fields of interest to society, in particular to the communities of the islands of Ibiza and Formentera. The Center for Advanced Studies has as its main short term objectives the promotion of research activities in the areas of environmental and energy modeling, sustainable development, information and communication technologies, and the preservation of the cultural and historical heritage in the islands of Ibiza and Formentera. An important activity of the Center is the the organization of courses, workshops and international conferences in different scientific and technical fields.

Registration Fees

The course fees are 550 € for academia and public research centres, and 950 € for industry. A limited number of grants covering 50% of the academia fees are available for students. After 1st of March the course fees will have a 200 € surcharge. On-line registration in available through the course web page. Grant applications should be submitted to the course Secretariat.

Accommodation

The organizers have arranged block reservations in hotels close to the course site. Details can be found on the website.

Course Secretariat

International Center for Numerical Methods in Engineering (CIMNE), Edificio C1, Campus Norte UPC,
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Supporting Organisations

- International Center for Numerical Methods in Engineering, CIMNE, Barcelona, Spain
- Center for Advanced Studies, Ibiza, Spain

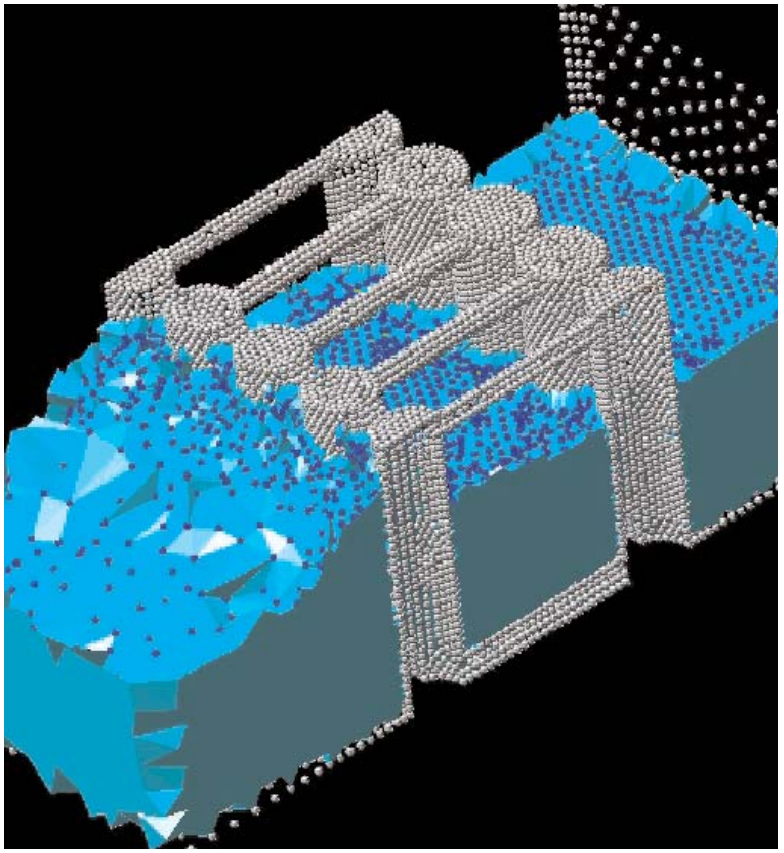
ECCOMAS School

Course on

Advanced Computational Methods for Fluid-Structure Interaction

3-7 May 2006, Ibiza, Spain

Organised by: Hermann G. Matthies and Roger Ohayon



http://congress.cimne.upc.edu/cfsi

Objectives

The ECCOMAS Schools have as the main focus to allow young researchers working on their doctoral thesis to have an "immersion" into a specific field of research in computational methods in applied sciences, while certainly being open to all other scientists from academia and industry.
This "immersion" will be achieved by attending a specifically designed lecture series by well known specialists in this field, and having the opportunity to present and discuss their specific research problem with these specialists and the other participants.

In this way young researchers and other scientists working to enter a specific field will be able to quickly obtain an overview and become acquired with the state of the art and relevant techniques in this field, see connections to other fields, and be able to identify promising areas of research.
Additionally, these schools help in creating a European network of researchers in a specific field, and thus aid in advancing the state of the art.

In many problems in the engineering and natural sciences, the behaviour of fluids and solids/ structures has to be considered jointly, as neglecting the interactions may lead to completely erroneous results. There are abundant applications in aerospace marine, civil, industrial and mechanical engineering, as well as in areas such as biotechnology, medical technology etc.

Most of these problems are not amenable to exact or analytical solutions, and approximative numerical techniques resulting in computational models have to be used.

These techniques, the coupling and interaction, numerical procedures, consistency and stability, efficient and fast solvers, as well as the implementational, computational and informatics backgrounds are the focus of this school.

Course Topics

The areas to be covered include:

- Review of mathematical formulations and general methodology (e.g. Eulerian, Lagrangian, ALE, ...)
- Finite Volume/finite element discretisations
- Meshfree methods
- Lattice-Boltzmann methods
- Mesh coupling, Lagrange multipliers...
- Coupling of partitioned analyses, strong coupling, ...
- X-FEM for FSI interfaces
- Hydro-elasticity, sloshing, slamming, problems with free surfaces
- Code-coupling middleware, computational environments

Course Directors

Hermann G. Matthies, Institut für Wissenschaftliches Rechnen, Germany, **wire@tu-bs.de**

Roger Ohayon, Conservatoire National des Arts et Metiers**,** France, **ohayon@cnam.fr**

Lecturers

D. Boffi
Dipartimento di Matematica
Università di Pavia, **Italy**

C. Farhat
The Institute for Computational and Mathematical Engineering, Stanford University, **USA**

L. Gastaldi
Dipartimento di Matematica
Università di Brescia, **Italy**

S. Idelsohn
Centro Internacional de Métodos Computacionales en Ingeniería
Santa Fé, **Argentina**

M. Krafczyk
Institut für Computeranwendungen im Bauingenieurwesen
TU Braunschweig, **Germany**

A. Kölke
Institut für Statik
TU Braunscheig, **Germany**

R. Löhner
Lab for Computational Fluid Dynamics, George Mason University, **USA**

H. Matthies
Institut für Wissenschaftliches Rechnen
TU Braunschweig,
Germany

R. Niekamp
Institut für Wissenschaftliches Rechnen
TU Braunschweig, **Germany**

R. Ohayon
Chaire de Mécanique,
Conservatoire National des Arts et Metiers, **France**

E. Oñate
International Center for Numerical Methods in Engineering
Universidad Politécnica de Cataluña, Barcelona, **Spain**

M. Peric
CD-adapco,
Nürnberg, **Germany**

A. Quarteroni
Modeling and Scientific Computing
Ecole Polytechnique Fédérale de Lausanne, **Switzerland**

Content of the Course

D. Boffi: Stability and Geometric Conservation Laws
C. Farhat: Formulation and General Methodology
L. Gastaldi: Immersed Boundary Methods
S. Idelsohn: Lagrangian Particle Methods
M. Krafczyk: Lattice-Boltzmann Methods
A. Kölke: X-FEM for FSI Interfaces
R. Löhner: Finite Element Formulations and Advanced Applications
H. Matthies: Strong Coupling Algorithms
R. Niekamp: Software Component Architecture
R. Ohayon: Vibrations and Potential Flow
E. Oñate: Finite Element and Particle Methods
M. Peric: Finite Volume Methods and Free Surface Flows
A. Quarteroni: Hemodynamics

Details of the schedule of the lectures will be given in the course web page: http://congress.cimne.upc.es/cfsi

Location

The conference will take place at the Center for Advanced Studies, Ibiza, Spain. The specific address will be announced in the course web page.