



UNIVERSITÀ DEGLI STUDI DI GENOVA

**SCUOLA DI DOTTORATO IN SCIENZE E TECNOLOGIE PER L'INGEGNERIA**  
**Dottorato in Fluidodinamica e Processi dell'Ingegneria Ambientale**

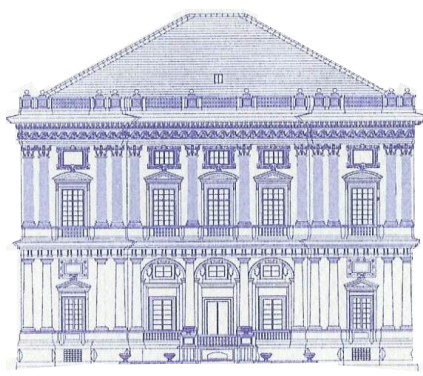
## AVVISO DI SEMINARIO

### **“Computational Fluid Dynamics for Cardiovascular Biomechanics”**

Dr. Simon Mendez

Institute of Mathematics and Modelling of Montpellier (I3M)  
University of Montpellier II  
Montpellier, France

Giovedì 15 Aprile, 2010 – ore 16.00  
Facoltà di Ingegneria,  
Aula A11, atrio DICAT  
Villa Giustiniani Cambiaso



Per informazioni contattare il Prof. Alessandro Bottaro,  
[alessandro.bottaro@unige.it](mailto:alessandro.bottaro@unige.it)



## **Computational Fluid Mechanics for Cardiovascular Biomechanics**

Cardiovascular diseases are one of the major causes of mortality in industrial countries. Over the last decades, the relation between the generation and development of cardiovascular diseases and the dynamics of the blood flow has been demonstrated. Thus, a better understanding of the hemodynamics in heart and vessels is expected to yield earlier diagnosis and more efficient treatments. Regarding the generation of space-time resolved hemodynamic data, Computational Fluid Dynamics (CFD) under physiological conditions is an alternative to available experimental techniques, which can only offer partial, low-resolution velocity measurements. It also gives access to the 3D unsteady blood pressure field and wall shear stress, which are out of reach of the non-invasive techniques.

The Scientific Computing group at I3M (Institute of Mathematics and Modeling of Montpellier, France) is involved in the development of high performance computing tools for medical applications. Notably, I3M focuses on the development of the numerical chain OCFIA ([www.ocfia.org](http://www.ocfia.org)) that allows the computation of the blood flow for patient-specific conditions (flow rates and moving geometry) collected by medical imaging. The aim is to build a complete protocol from the medical imaging on a patient to the CFD, usable by surgeons and physicians without deep CFD knowledge. I3M is directly collaborating with hospitals in Toulouse, Montpellier, and Rennes. At the same time, I3M wants to tackle the issue of optimization of the artificial devices used to treat cardiovascular diseases. In the seminar, the context of the research at I3M on biomechanics will be described in details, together with the main achievements and the major challenges that remain.

## **Biographical sketch of Simon Mendez**

Simon Mendez obtained his PhD in 2007 at CERFACS (Toulouse), working with Prof. F. Nicoud on the model of the flow field and the acoustics around a perforated plate. After a one-year postdoc in CERFACS, he joined Stanford University, collaborating with Prof. S. Lele on the Large-Eddy Simulations of supersonic jet noise. Since January 2010 he is "Researcher" at CNRS, University Montpellier II, employing CFD tools for cardiovascular applications.