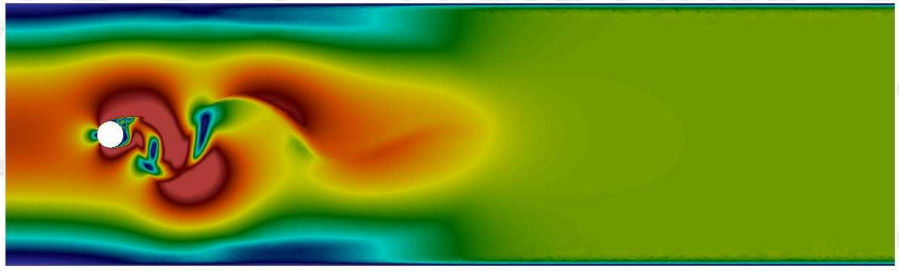
Università degli Studi di Pavia
Computational Mechanics & Advanced Materials Group - DICAr

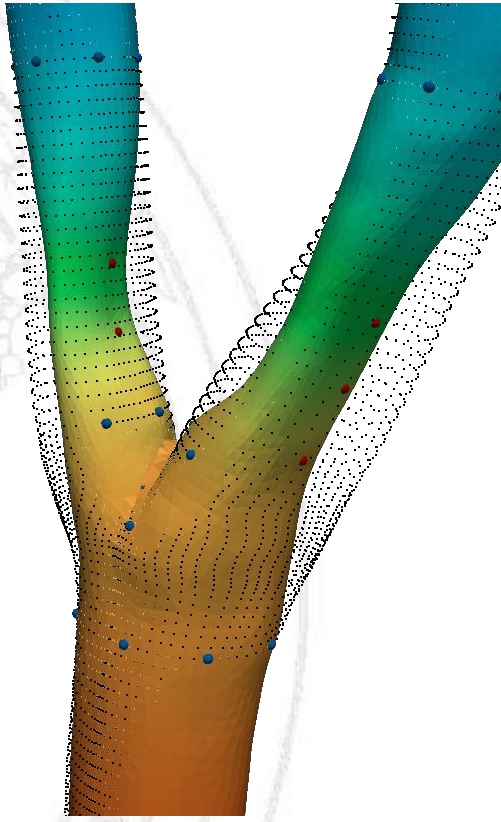
3D@UniPV
Virtual Modeling and Additive Manufacturing for Advanced Materials

SEMINAR

Reduced Order Methods for Parametric Problems in Computational Fluid Dynamics, with Applications in Hemodynamics and Industry

In these twin talks, we provide the state of the art of Reduced Order Methods (ROM) for parametric Partial Differential Equations (PDEs), especially in Computational Fluid Dynamics (CFD), with a special interest in hemodynamics and industrial applications.
Systems modelled by PDEs may be depending on several parameters, influencing dimensionless quantities of the physical model, geometrical properties of the domain, and uncertain data associated e.g. to forcing terms or boundary conditions.
The first step of the presented ROM framework aims at performing a dimensionality reduction of the parameter space, i.e. detecting which parameters (or combinations thereof) are the most relevant for the application at hand. The second step of the ROM framework concerns the reduction of the computational model by means of the reduced basis method. Key ingredients leading to an offline-online decoupling of the computational procedure will be introduced. State of the art procedure and current research goals will be briefly discussed, especially for what concerns applications to complex problems in fluid dynamics. Applications of the resulting framework to hemodynamics (combined parameter space and model reduction for CFD in carotid arteries, assimilation of clinical measurements by optimal flow control) and industrial engineering will be presented throughout the talks.





Prof. Gianluigi Rozza and **Prof. Francesco Ballarin**
SISSA, Mathematics Area, mathLab
SISSA – International School for Advanced Studies, Trieste, Italy

November 19th, 11:00 am (sharp)
DICAr MS1 Meeting Room
Via Ferrata, 3 – Pavia