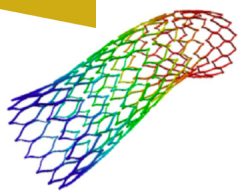
Università degli Studi di Pavia

Computational Mechanics & Advanced Materials Group

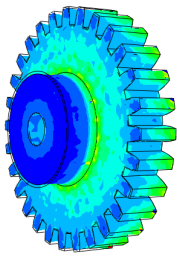


Esame finale di dottorato in

Ingegneria Civile e Architettura (ciclo XXX)

Curriculum:

"Meccanica Computazionale e Materiali Avanzati" e "Strutture"



12 Marzo 2018

Aula Foscolo, Università degli Studi di Pavia

Ore 9:30 — **Gianluca Alaimo**

Material behavior and manufacturing solutions for biomedical applications: from computational optimization to 3D Printing

This thesis investigates material behavior and advanced manufacturing solutions, with specific focuses ranging from computational optimization tools to effective component production through 3D printing technologies. The developed tools are mainly applied to biomedical field as a promising area for the use of sophisticated computational mechanics tools.

Ore 10:15 — **Valentina Mercuri**

Form and structural optimization: from beam modeling to 3D printing of reinforced concrete members

The talk concerns both the study of new numerical tools when used for complex design problems and a novel approach for the 3D printing of optimized structural elements. Firstly, an accurate non-prismatic beam model is compared with building software in real design cases. Then, an innovative 3D printing method for concrete is proposed together with some preliminary studies on possible compatible topology optimization strategies.

Ore 11:00 — **Rodrigo M. Romarowski**

Moving Computational Tools for Aortic Disease from the Bench to the Bedside

Computational fluid dynamics (CFD) in the aorta are nowadays well established among researchers. The aim of this thesis is to fill the methodological and conceptual gaps between CFD and medical needs in the field of thoracic aortic syndromes. A strong focus will be done on boundary conditions and a novel methodology for tuning parameters will be discussed. Also, more advanced applications suited for TEVAR will be approached, such as merging virtual stent-graft deployment with predictive hemodynamics. We conclude that the developed methods satisfactorily fill the different gaps needed for simulating big cohorts of patients and extract both single-patient and population-based results.

Ore 11:45 — **Xi Zou**

Simulation Tools for Biomechanical Applications with PGD-Based Reduced Order Models

In this work, several novel computational techniques are developed to explore the capability of Proper Generalised Decomposition (PGD), which is an important approach of reduced order modelling (ROM). To assess the usability of the PGD-based ROM for biomechanical applications, a real human femur bone is chosen to study its mechanical behaviour as an example. Standard image-based modelling procedure in biomechanics is performed to create an FE model which is then validated with in vitro experimental results.

Membri della Commissione:

S. Perotto (PoliMi), G. Rozza (Sissa), L. Ferrara (PoliMi)