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

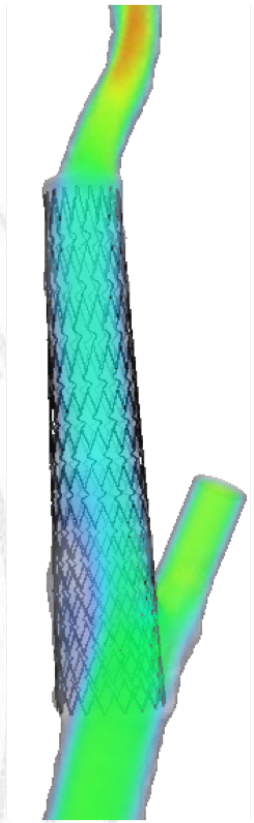
3D@UniPV
Virtual Modeling and Additive Manufacturing for Advanced Materials

CHT
Centre for Health Technologies
University of Pavia

Cardiovascular Fluids Modeling: From Pulsatile Ventricular Assist Devices to Stent Modeling

SEMINAR

In this presentation, a collection of computational techniques that enable realistic simulation of pulsatile Ventricular Assist Devices (VADs) and stent modeling is presented. The VAD simulations involve dynamic interaction of air, blood, and a thin membrane separating the two fluids, while the stent modeling utilizes a penalty method of immersed boundaries within a finite element framework to model subgrid-scale features of the stent. The computational challenges addressed in this work include large, buckling motions of the membrane, the need for periodic remeshing of the fluid mechanics domains, and the necessity to employ tightly coupled Fluid-Structure Interaction (FSI) solution strategies due to the very strong added mass effect present in the problem. FSI simulation of a pulsatile VAD at realistic operating conditions is presented, and a shape-based optimization on flow parameters believed to be linked with thrombogenesis is performed.



Dr. Chris Long
Los Alamos National Laboratory, New Mexico (US)
T-3 Fluid Dynamics and Solid Mechanics Group

March 30th, 12:30pm
DICAr MS1 Meeting Room
Via Ferrata, 3 – Pavia