11th. World Congress on Computational Mechanics (WCCM2014)
5th. European Conference on Computational Mechanics (ECCM V)
6th. European Conference on Computational Fluid Dynamics (ECFD VI)
July 20 - 25, 2014, Barcelona, Spain

COMPUTATIONAL MODELLING OF NATIVE AND ENGINEERED CARDIOVASCULAR TISSUE

ILINCA STANCIULESCU[*] AND ELLEN KUHL[†]

[*] Rice University
6100 Main Street, Houston, TX 77005, USA
ilinca.s@rice.edu

[†] Stanford University
50 Serra Mall, Stanford, CA 94305
ekuhl@stanford.edu

Key words: Cardiovascular tissue, Tissue engineering, Biomechanics.

ABSTRACT

Cardiovascular disease is the leading cause of death in the industrialized nations. Despite intense research, there are still many cardiovascular diseases for which there is only insufficient treatment or no cure at all. Understanding the behaviour of cardiac and cardiovascular tissue at all scales of observation is important to design and optimization of treatment strategies and critical to cardiac surgery, cardiology, tissue engineering, material sciences, bioengineering, biology, and cellular physiology. Computational modelling is a powerful tool, if not the only one, to link the individual scales and bring these disciplines together. To no surprise, computational modelling is beginning to be recognized as an important discipline in understanding cardiovascular disease.

This symposium on computational modelling of native and engineered cardiovascular tissue aims at bringing together researchers across different disciplines and scales with the common goal to design new mathematical models and computational tools to model cardiovascular tissue in health and disease. Problems of interest include, but are not limited to, constitutive modelling of healthy cardiac or cardiovascular tissue, constitutive modelling of heart valves, modelling of the cardiovascular system, optimization of engineered tissue, prediction of tissue response during disease progression, growth and remodelling of aneurysms and aneurysm fracture, hypertrophic growth and remodelling of the heart, modelling and interplay of active and passive stresses, and novel concepts of measuring and modelling pre-stress. Problems addressing the coupling across multiple physical fields and scales and interactions between native and engineered or healthy and diseased tissue are of particular interest.