6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11 – 15 June 2018, Glasgow, UK

NUMERICAL MODELING OF THE ELECTROMECHANICAL ACTIVITY OF THE LEFT VENTRICLE WITH INCLUSION OF THE PURKINJE NETWORK

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Key Words: *Purkinje network, cardiac mechanics, electro-mechanical coupling.*

In this talk, we consider the numerical approximation of the electro-mechanical coupling in the ventricles with inclusion of the Purkinje system.
The underlying mathematical model couples the elastodynamics equations for the myocardium displacement, the bidomain equations for the myocardium electrophysiology, and the 1D monodomain equation for the electrical activity in the Purkinje network. For the numerical solution of this coupled problem, we consider a fixed-point iterative algorithm that enables a partitioned solution of the myocardium and Purkinje network problems.
Different levels of myocardium-network splitting are considered and analyzed.
The results are compared with those obtained using standard strategies alternative to the Purkinje network proposed in the literature to trigger the electrical activation.
Finally, we present a physiological cardiac simulation, including the initiation of the signal in the Purkinje network and the systolic and diastolic phases, and simulations of some pathological scenarios such as left bundle branch block.