Numerical Solution Algorithms for Cardiac Modeling

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ABSTRACT

This presentation will focus on numerical models for the solution of the coupled cardiac problem. Coupling involves the electrophysiology model, the mechanical model for the deformation (contraction and relaxation) of the myocardium, and the fluid dynamics of blood in the left ventricle (1),(2). The numerical solution is based on finite elements in space and finite differences in time (3). The monolithic algebraic formulation at every time step is Newton linearized first, then solved with preconditioned Krylov methods. Preconditioners are obtained by matrix factorization and ad-hoc domain decomposition or algebraic multigrid solvers for each field.

Several numerical tests on idealized as well as real geometries will be presented.

REFERENCES