

An Optimal Control Approach to Cardiac Electrophysiology

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Abstract: The bidomain equations are an accepted model for the electro-physiological activity of the heart. To describe the influence of extracellular current density stimulus and to determine its optimal intensity as a function of time (and space) an optimal control problem is formulated and analysed. A well-posedness theory for the primal and adjoint equations is provided, and necessary optimality conditions are proven in a function space setting. Aspects of the numerical realisation based on nonlinear CG and Newton methods are discussed and numerical examples demonstrating the capability of termination of reentry phenomena are presented.

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