STABILITY RESULTS FOR THE PARAMETER IDENTIFICATION INVERSE PROBLEM IN CARDIAC ELECTROPHYSIOLOGY

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The aim of this work is to establish stability estimates for the parameter identification problem in cardiac electrophysiology modeling. The propagation of the electrical wave in the heart is described by the monodomain equation. The model consists of a reaction-diffusion non linear equation coupled to an ODE system representing the electrical activity of the cell membrane.

Theorem 1. Let (V,W) defined as in (0.2) with the initial condition V_0 ∈ H^2(Ω).
Let us assume that
\[ \frac{\partial f}{\partial a}(\tilde{V}_m, \tilde{w}) \geq r_0 > 0 \quad \text{for some} \quad T' > 0 \quad \text{and} \quad \forall x \in \Omega. \]
Then there exists C > 0 such that
\[ |a - \tilde{a}| \leq CN_{T',\omega_0}(V,W), \]
where
\[ N_{T',\omega_0}(V,W) = \|V\|_{H^1(0,T,L^2(\omega_0))} + \|V\|^2_{L^2(0,T,L^2(\omega_0))} + \|V(T')\|_{H^2(\Omega)} + \|V(T')\|^2_{L^2(\Omega)} + \|W(T')\|_{L^2(\Omega)}. \]