On the Optimization of Biological Field Effect Transitors

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Abstract

Biological field effect transistors (Bio-FET) are low-cost, portable, and accurate detection tools that offer a path to personalized healthcare through tailored care to individuals or specific subsets of a population. One promising strategy for optimal design of (Bio-FET) seeks design variables that maximize a Bio-FET's signal which, concurrently, leads to signal distortion. A new mathematical formulation of this important problem is presented which employs a nonlinear integrodifferential equation and imposes constraints to simultaneously optimize two competing objectives. These two conflicting objectives can be reconciled through an optimal control formalism developed by Jacques-Louis Lions.