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Solving Inverse Problems in Electrocardiography with Physics-Informed Neural Networks

Communication Info

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Abstract

We investigate the inverse problem in electrocardiography, whose goal is to reconstruct the cardiac surface potentials from torso measurements. The forward model is described by a Laplace-type equation, modeling the torso as a passive volume conductor [1]. Because this inverse problem is inherently ill-posed, we formulate it as a regularized optimization problem and compute gradients using an adjoint approach [2]. The reconstruction is carried out with Physics-Informed Neural Networks (PINNs), which enforce the governing physical constraints during training [3]. Numerical experiments on simplified geometries demonstrate stable reconstructions, consistent with established inverse-ECG methodologies [4].

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