

Applied Mathematics

Convergence and regularization for monotonicity-based shape reconstruction in EIT

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The inverse problem of electrical impedance tomography is severely ill-posed, meaning that, only limited information about the conductivity can in practice be recovered from boundary measurements of electric current and voltage. Recently it was shown that a simple monotonicity property of the related Neumann-to-Dirichlet map can be used to characterize shapes of inhomogeneities in a known background conductivity. In this presentation we formulate a monotonicity-based shape reconstruction scheme that applies to approximative measurement models, and regularizes against noise and modelling error. We demonstrate that for admissible choices of regularization parameters the inhomogeneities are detected, and under reasonable assumptions, asymptotically exactly characterized. Moreover, we rigorously associate this result with the complete electrode model, and describe how a computationally cheap monotonicity-based reconstruction algorithm can be implemented. Numerical reconstructions from both simulated and real-life measurement data are presented.

This is joint work with Henrik Garde.