EIT perturbed by ultrasound: recovering a conductivity map from the energy density

Frederic de Gournay

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Abstract

We address the problem raised by the new Echoscan technology, which is electrical impedance tomography perturbed by an ultrasound. The mathematical problem is the following: If $u$ solves the conductivity equation $\text{div} \gamma \nabla u = 0$ in a domain, given the value of $\gamma |\nabla u|^2$ on a subset of this domain, is it possible to recover $\gamma$?

We will show how the problem arises in practical situations, investigate its well-posedness, show numerical reconstruction results and list some open questions.