

Chapko, Roman; Kress, Rainer; Yoon, Jeong-Rock

An inverse boundary value problem for the heat equation: The Neumann condition. (English)

Zbl 1044.35527

Inverse Probl. 15, No. 4, 1033-1046 (1999).

Summary: We consider the inverse problem to determine the shape of an insulated inclusion within a heat conducting medium from overdetermined Cauchy data of solutions for the heat equation on the accessible exterior boundary of the medium. For the approximate solution of this ill-posed and nonlinear problem we propose a regularized Newton iteration scheme based on a boundary integral equation approach for the initial Neumann boundary value problem for the heat equation. For a foundation of the Newton method we establish the differentiability of the solution to the initial Neumann boundary value problem with respect to the interior boundary curve in the sense of a domain derivative and investigate the injectivity of the linearized mapping. Some numerical examples for the feasibility of the method are presented.

MSC:

35R30 Inverse problems for PDEs

35K05 Heat equation

80A22 Stefan problems, phase changes, etc.

Cited in **30** Documents

Full Text: [DOI](#)