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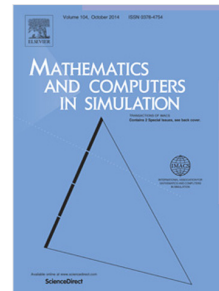
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Optimization method for determining the source term in fractional diffusion equation

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Abstract

In this paper, we determine a spacewise dependent source in one-dimensional fractional diffusion equation. On the basis of the optimal control method, the existence, uniqueness and stability of the minimizer for the cost functional are established. The Landweber iteration method is applied to the inverse problem.

Keywords: Inverse problem, Source term, Fractional diffusion equation, Regularization, Optimal control

2010 MSC: 35R30, 35R11, 65M32

1. Introduction

The fractional diffusion equation is a generalization of the classical diffusion equation which models anomalous diffusive phenomena. In recent years, inverse problems for time-fractional diffusion equation have become very active, interdisciplinary research area.

In this paper, we consider an initial-boundary value problem for the fractional diffusion equation in the form

$$\left. \begin{aligned} {}_0\partial_t^\alpha u(x, t) - u_{xx}(x, t) &= F(x, t) + f(x), & x \in (0, 1), t \in (0, T], \\ u(x, 0) &= \phi(x), & x \in [0, 1], \\ u(0, t) = u(1, t) &= 0, & t \in (0, T], \end{aligned} \right\} \quad (1.1)$$

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