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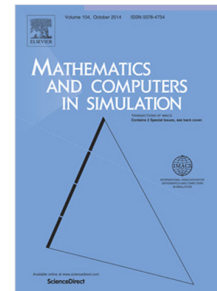
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Solving the backward problem for space-fractional diffusion equation by a fractional Tikhonov regularization method ^{*}

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Abstract

In this paper, we consider the backward problem for diffusion equation with space-fractional Laplacian. In order to overcome the ill-posedness of the backward problem, we propose a fractional Tikhonov regularization method to solve it. Based on the conditional stability estimate and an *a posteriori* regularization parameter choice rule, the convergence rate estimate are presented under *a-priori* bound assumption for the exact solution. Finally, several numerical examples are given to show that the proposed numerical methods are effective.

Key words: Backward problem; fractional Tikhonov regularization method; diffusion equation; fractional Laplacian; convergence rate estimate; *a posteriori* parameter choice.

1 Introduction

During recent years, fractional calculus and fractional differential equations have been more and more extensively used in various scientific fields. For example, physical, chemical, biology, mechanical engineering, signal processing and systems identification, electrical, control theory, finance, fractional dynamics and so on, refer to [7, 19, 21, 23, 25, 28, 29, 34].

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