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On a space fractional backward diffusion problem and its approximation of local solution

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Abstract

This article deals with a backward diffusion problem for an inhomogeneous backward diffusion equation with fractional Laplacian in \mathbb{R} :

$$\begin{cases} u_t(x, t) + (-\Delta)^\alpha u(x, t) = f(x, t), (x, t) \in \mathbb{R} \times [0, T], \\ u(x, T) = g(x), x \in \mathbb{R}, \\ \lim_{x \rightarrow \pm\infty} u(x, t) = 0. \end{cases}$$

This problem is an ill-posed problem due to the instability in solution. The goal of this paper is not only to provide a simple but effective regularization scheme to obtain the Hölder convergence rate, but also to give an approximation of solution of the equation with fractional diffusion to the one of the equation with Laplacian

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