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UNIFORM STABILITY FOR FRACTIONAL CAUCHY PROBLEMS AND APPLICATIONS

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Abstract. In this paper we give uniform stable spatial bounds for the resolvent operator families of the abstract fractional Cauchy problem on $\mathbb{R}_+$. Such bounds allow to prove existence and uniqueness of μ-pseudo almost automorphic ε-mild regular solutions to the nonlinear fractional Cauchy problem in the whole real line. Finally, we apply our main results to the fractional heat equation with critical nonlinearities.

1. Introduction

In recent years, the study of fractional partial differential equations has grown considerably because these equations provide a useful framework to deal with real-world problems in several disciplines as biology, chemistry, economy, engineering, medicine and physics. For example, fractional models describe the motion of a viscous fluid between moving surfaces ([27]), as well as the diffusion phenomena in the special types of porous medium ([39]).

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