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Fractional Nonlinear Reaction-Diffusion System with Gradient Source Terms

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Abstract: Over the years, partial reaction-diffusion systems have attracted the attention of numerous researchers due to their application in various fields such as, for example, population dynamics, the dynamics of gas, dynamic systems, fusion process, certain biological models, etc. The aim of this work is to prove the global existence of a solution for an arbitrary-order fractional reaction-diffusion system. The inspiration for this study arises from the research conducted recently by Barrouk and Mesbahi [2].

Keywords: *semigroups; fractional reaction-diffusion systems; local solution; global solution.*

Mathematics Subject Classification (2020): 35R11, 35K57, 35K55, 37L05, 70K99, 93A30.

1 Introduction

In recent years, fractional differential equations have garnered significant attention from researchers because of their extensive applications across various scientific, technological, and medical fields, we can find important applications, for example, in finance [15], mechanics [14], biomedicine [9], pattern formation [8], we find numerous real applications in biology, medicine and ecology, see the works of Djemai and Mesbahi [6], Khayar, Brouri and Ouzahra *[12]* and corresponding references therein, etc.

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