Existence Results for Sobolev Type Fractional Differential Equation with Nonlocal Integral Boundary Conditions

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Abstract: In this paper, a Sobolev type fractional differential equation with nonlocal integral boundary condition is investigated. The theory of resolvent operators, fractional calculus and fixed point techniques are used to study the existence results to the given equation. In the end, an example is provided to illustrate the applications of the abstract results.

Keywords: *fractional differential equations; fixed point theorems; resolvent operator; nonlocal boundary conditions.*

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1 Introduction

In a few decades, fractional differential equations have received much attention of researchers mainly due to their extensive interesting applications in physics, mechanics and engineering such as electrochemistry, control theory, signal and image processing, porous media, electromagnetism etc.(see [23], [24], [29]). The fact, that fractional derivative (integral) is an operator which includes integer order derivatives (integrals) as special case and describes the hereditary properties and memory effects of various materials, is the reason why fractional differential equations are more precise in the modeling of many phenomena. Many physical phenomena such as seepage flow in porous media and in fluid dynamic traffic models [20] and nonlinear oscillations of earthquakes [21] can be described

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