

Existence of solutions for fractional differential equations of order $q \in (2, 3]$ with anti-periodic boundary conditions

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Abstract In this paper, we prove the existence of solutions for an anti-periodic boundary value problem of fractional differential equations of order $q \in (2, 3]$. The contraction mapping principle and Krasnoselskii's fixed point theorem are applied to establish the results.

Keywords Fractional differential equations · Anti-periodic boundary conditions · Existence · Contraction principle · Krasnoselskii's fixed point theorem

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1 Introduction

The study of fractional differential equations ranges from the theoretical aspects of existence and uniqueness of solutions to the analytic and numerical methods for finding solutions. Fractional differential equations appear naturally in a number of fields such as physics, polymer rheology, regular variation in thermodynamics, biophysics, blood flow phenomena, aerodynamics, electro-dynamics of complex medium, viscoelasticity, Bode's analysis of feedback amplifiers, capacitor theory, electrical circuits, electron-analytical chemistry, biology, control theory, fitting of experimental data, etc. An excellent account in the study of fractional differential equations can be found in [10, 11, 18]. For the basic theory and recent development of the subject, we refer a text by Lakshmikantham [15]. For more details and examples, see [1, 6, 8, 9, 12–20, 22] and the references therein.

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