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EXISTENCE OF SOLUTIONS FOR IMPULSIVE ANTI-PERIODIC BOUNDARY VALUE PROBLEMS OF FRACTIONAL SEMILINEAR EVOLUTION EQUATIONS

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Abstract. This paper studies the existence and uniqueness of solutions for impulsive semilinear evolution equations of fractional order $q \in (1, 2]$ with anti-periodic boundary conditions. The contraction mapping principle and Krasnoselskii's fixed point theorem are applied to prove the main results. An illustrative example is also presented.

Keywords. Evolution equations of fractional order; impulse; anti-periodic boundary conditions; existence; contraction mapping principle; Krasnoselskii's fixed point theorem.

AMS (MOS) subject classification: 26A33, 34A34, 34B15.

1 Introduction

In recent years, fractional differential equations have been addressed by several researchers. 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 various fields of science and engineering such as physics, polymer rheology, regular variation in thermodynamics, biophysics, blood flow phenomena, aerodynamics, electro-dynamics of complex medium, viscoelasticity, Bodes analysis of feedback amplifiers, capacitor theory, electrical circuits, electron-analytical chemistry, biology, control theory, fitting of experimental data, etc. For some recent development of the subject, see [3, 5, 6, 9, 10, 16, 20, 21, 22, 24, 25, 29, 30, 31, 33] and the references therein.
Anti-periodic boundary value problems occur in the mathematical modeling of a variety of physical processes and have recently received considerable attention. Examples include anti-periodic trigonometric polynomials in the study of interpolation problems [17], anti-periodic wavelets [14], difference equations [1, 13, 37], ordinary, partial and abstract differential equations [19, 26, 28, 36, 38], impulsive differential equations [4, 7, 18], etc. The recent