Random Impulsive Partial Hyperbolic Fractional Differential Equations

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Abstract: This paper deals with the existence of random solutions of Darboux problem of impulsive fractional differential equations. The main results are based on the measure of noncompactness and a fixed point theorem for random operators.

1 Introduction

Fractional calculus is generalization of ordinary differentiation and integration to arbitrary non-integer order. The subject is as old as the differential calculus, starting from some speculations of G.W. Lebeniz (1967) and L. Euler (1730) and since then, it has continued to be developed up to nowadays. Integral equations are one of the most useful mathematical tools in both pure and applied analysis. This is particulary true for problems in mechanical vibrations and the related fields of engineering and mathematical physics. We can find numerous applications of differential and integral equations of fractional order in finance, hydrology, biophysics, thermodynamics, control theory, statistical mechanics, astrophysics, cosmology and bioengineering [10, 14, 19, 20, 23]. There has been a significant development in ordinary and partial fractional differential equations in recent years; see the monographs of Abbas *et al.* [5, 6], Baleanu *et al.* [10], Kilbas *et al.* [16], Zhou [25], the papers of Abbas *et al.* [1–3, 7], Sowmya and Vatsala [21], Stutson and Vatsala [22], Vityuk and Golushkov [24], and the references therein.

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