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EXISTENCE RESULTS FOR ABSTRACT FRACTIONAL INTEGRO DIFFERENTIAL EQUATIONS

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Abstract. In this paper we discuss about the solution of abstract fractional integro differential equations with the operator A. The solution obtained by using Mittag-Leffler function is correct when the operator A is bounded. We also obtain a suitable form of solution to stochastic fractional differential equations with unbounded operators.

Keywords. Fractional differential equation, Time-fractional diffusion equation, Stochastic fractional differential equation, Integro differential equation.

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1 Introduction

Theory of fractional derivatives which developed as a pure theoretical field found its major application in calculus after the realization that the properties of various real world materials are better described using fractional integrals and fractional derivatives. It has been shown that models with fractional order derivatives are more adequate than integer order models. The main reason is that fractional derivatives provide an excellent instrument for the description of memory and hereditary properties of various materials and processes. They are valuable tools in modeling many phenomenon in various fields of science and engineering like viscoelasticity, electrochemistry control, porous media and electromagnetic etc.

The mathematical modelling and simulation of systems and processes, based on the description of their properties in terms of fractional derivatives, naturally leads to differential equations of fractional order and to the necessity to solve such equations. However, effective general methods for solving