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SYSTEM OF RANDOM VARIATIONAL INCLUSIONS INVOLVING RANDOM FUZZY MAPPINGS WITH XOR-OPERATION

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Abstract. The purpose of this paper is to introduce and study a system of random variational inclusions involving random fuzzy mappings with XOR-operation in real ordered uniformly smooth Banach spaces. We define an iterative algorithm for finding the approximate solution of our system and establish the convergence of the iterative sequences generated by the proposed algorithm. We claim that our results are new and refinement of many previously known results. In support of our problem, we provide an example.

1. Introduction

Many problems of basic and applied sciences can be modelled in terms of variational inclusions, which include the study of differential equations, mechanics, contact problem in elasticity, optimization problems, etc., see for example [11,12,20,30–34]. An important area of modern sciences called fuzzy set theory due to Zadeh [37] have wide applications in many branches of mathematical and engineering sciences including artificial intelligence, management science, computer science, etc..As an application of fuzzy set theory, Aubin [6] proposed to use fuzzy coalitions allowing an asymmetry of the participation of players.

Ansari [5] and Chang et al. [13] almost simultaneously first introduced the concept of variational inequalities for fuzzy mappings. Since then several types of variational inequalities (inclusions) with fuzzy mappings were considered by Chang et al. [9], and Ding et al. [17] in Hilbert spaces. Moreover, Huang et al. [19] considered nonlinear equation in fuzzy normed spaces, Lan et al. [23] considered fuzzy variational inclusions and Ahmad et al. [1] studied generalized variational inclusions with fuzzy mappings.

To deal with probabilistic models in applied sciences, the random equations involving random operators play important role. The uncertain events occurring in decision-making problems are characterized by fuzzy uncertainty as well as randomness. Fuzzy random uncertainty appears in real world applications such as inventory management, facilities planning, transportation, assignment, equilibrium problems for economics and migration theory. Moreover, monotone operator theory and convex analysis on one hand and measurable selection theory on the other hand have been combined to prove existence of solution of traditional variational inequalities and random variational inequalities [7, 14–16, 26, 28, 29, 35]. They are applicable

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