

APPROXIMATION OF *-NONEXPANSIVE RANDOM MULTIVALUED OPERATORS ON BANACH SPACES

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Abstract

We establish the existence and approximation of solutions to the operator inclusion $y \in Ty$ for deterministic and random cases for a nonexpansive and *-nonexpansive multivalued mapping T defined on a closed bounded (not necessarily convex) subset C of a Banach space. We also prove random fixed points and approximation results for *-nonexpansive random operators defined on an unbounded subset C of a uniformly convex Banach space.

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1. Introduction and preliminaries

Probabilistic functional analysis is an important mathematical discipline because of its applications to probabilistic models in applied problems. Random operators lie at the heart of this discipline and their theory is needed for the study of various classes of random equations. The study of random fixed points and random approximations have gained tremendous importance after the publication of papers by Beg [2], Beg and Shahzad [6, 4, 5], Lin [15, 14], Papageorgiou [17], Sehgal and Singh [20, 19], Tan and Yuan [25, 24, 23] and Xu [26].

In this paper the notions of *-nonexpansive and weakly nonexpansive multivalued maps with values which are not subsets of the domain are introduced. In Section 2, the existence and approximation of solutions to the nonlinear operator inclusion $y \in Ty$ is discussed. Section 3 deals with the approximation of solutions to the nonlinear random operator inclusion $y(\omega) \in T(\omega, y(\omega))$ for each $\omega \in \Omega$, where (Ω, \mathcal{A}) is a measurable