FUZZY FIXED POINTS OF FUZZY MAPPINGS VIA A RATIONAL INEQUALITY

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Abstract
We establish the existence of common fuzzy fixed points for fuzzy mappings under a rational contractive condition on a metric space in connection with the Hausdorff metric on the family of fuzzy sets, and apply it to obtain common fixed points of fuzzy (multivalued) mappings satisfying a rational contractive condition associated with the $d_\infty$ (Hausdorff) metric.

Keywords: Fixed point, Common fixed point, Contractive type mapping, fuzzy mapping.


1. Introduction and preliminaries

Fixed point theorems are very important tools for providing evidence of the existence and uniqueness of solutions to various mathematical models. The literature of the last four decades flourishes with results which discover fixed points of self and nonself nonlinear operators in a metric space. The Banach contraction theorem plays a fundamental role in fixed point theory and has become even more important because being based on iteration, it can be easily implemented on a computer. On the other hand Fisher [15] obtained common fixed points of a pair $S, T : X \to X$ of single mappings satisfying a rational inequality by demonstrating the convergence of sequence of iterates of $S, T$ in a complete metric space $X$.

Among various developments of fuzzy sets theory, a progressive development has been made to find the fuzzy analogues of fixed point results of the classical fixed point theorems. In this paper, we use a generalized contractive condition involving a rational expression to study common fuzzy fixed point theorems for fuzzy set valued mappings. In the following we always suppose that $(X, d)$ is a complete metric space and $(V, d)$ a complete metric space.