



Coupled fixed point theorems for contractions in intuitionistic fuzzy normed spaces[☆]

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ABSTRACT

Following the definition of coupled fixed point [T. G. Bhaskar, V. Lakshmikantham, Fixed point theorems in partially ordered metric spaces and applications, *Nonlinear Anal.* 65 (2006) 1379–1393], we prove a coupled fixed point theorem for contractive mappings in partially complete intuitionistic fuzzy normed spaces.

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1. Introduction and preliminaries

The Banach contraction principle [1] is a classical and powerful tool in nonlinear analysis and has been generalized by many authors (see [2–12] and others).

Recently, Bhaskar and Lakshmikantham [13] have introduced the notion of a coupled fixed point in partially ordered metric spaces, also discussed some problems of the uniqueness of a coupled fixed point and applied their results to the problems of the existence and uniqueness of a solution for the periodic boundary value problems. Later, in [14], Lakshmikantham and Ćirić proved some more coupled fixed point theorems in partially ordered sets.

In recent years, the fuzzy theory has emerged as the most active area of research in many branches of mathematics, natural sciences, engineering and many others. This new theory was introduced by Zadeh [15] in 1965 and, since then, a large number of research papers have been published in many kinds of nice journals by using the concept of fuzzy set/numbers and fuzzification of many classical theories has also been made. Very recently, it has also very useful applications in various fields, for example, population dynamics [16], chaos control [17], computer programming [18], nonlinear dynamical systems [19], fuzzy physics [20], fuzzy topology, fuzzy common fixed point theorem [21], fuzzy stability problems [22–24], nonlinear operators [25,26], statistical convergence [27,28], etc.

The concept of intuitionistic fuzzy normed spaces initially has been introduced by Saadati and Park [29]. In [30], by modifying the separation condition and strengthening some conditions in the definition of Saadati and Park, Saadati et al. have obtained a modified case of intuitionistic fuzzy normed spaces. Further, many authors have also considered the intuitionistic fuzzy normed linear spaces and intuitionistic fuzzy 2-normed space (see [31–34]).

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