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Results on *n*-tupled fixed points in complete asymptotically regular metric spaces

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Abstract The notion of *n*-tupled fixed point is introduced by Imdad, Soliman, Choudhury and Das, Jour. of Operators, Vol. 2013, Article ID 532867. In this manuscript, we prove some *n*-tupled fixed point theorems (for even *n*) for mappings having mixed monotone property in partially ordered complete asymptotically regular metric spaces. Our main theorem improves the corresponding results of Imdad, Sharma and Rao (M. Imdad, A. Sharma, K.P.R. Rao, Generalized *n*-tupled fixed point theorems for nonlinear contractions, preprint).

2010 MATHEMATICAL SUBJECT CLASSIFICATION: 47H10; 54H10; 54H25

1. Introduction and preliminaries

The Banach contraction principle is the most natural and significant result of fixed point theory. It has become one of the most fundamental and powerful tools of nonlinear analysis because of its wide range of applications to nonlinear equations arising of in physical and biological processes ensuring the existence and uniqueness of solutions. It is widely considered as the source of metric fixed point theory. Also, its significance lies in its vast applicability in a number of branches of mathematics. Generalization of the above principle has been a heavily branch of mathematics. Existence of a fixed point for contraction type mappings in partially ordered metric space and applications have been considered by many authors. There already exists an extensive literature on this topic, but keeping in view the relevance of this paper, we merely refer to [1–13,17–31].

In [6], Bhaskar and Lakshmikantham introduced the notion of a coupled fixed point and proved some coupled fixed point theorems in partially ordered complete metric spaces under certain conditions. Afterwards Lakshmikantham and Ćirić [17] extended these results by defining the g-monotone property, which indeed generalize the corresponding fixed point theorems contained in [6]. Since then Berinde and Borcut [8] introduced the concept of tripled fixed point and proved some related theorems.

Recently Imdad et al. [14] introduced the concept of *n*-tupled coincidence as well as *n*-tupled fixed point (for even *n*) and utilize these two definitions to obtain *n*-tupled coincidence

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