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Generalized Meir-Keeler type n-tupled fixed point theorems in ordered partial metric spaces

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Abstract
In this paper, we prove n-tupled fixed point theorems (for even n) for mappings satisfying Meir-Keeler type contractive condition besides enjoying mixed monotone property in ordered partial metric spaces. As applications, some results of integral type are also derived. Our results generalize the corresponding results of Erduran and Imdad (J. Nonlinear Anal. Appl. 2012:jnaa-00169, 2012).

Keywords: partially ordered set; partial metric space; generalized Meir-Keeler type contractive condition; mixed monotone property; n-tupled fixed point

1 Introduction

Existence of a fixed point for contraction type mappings in partially ordered metric spaces with possible applications have been considered recently by many authors (*e.g.* [1–31]). Recently many researchers have obtained fixed and common fixed point results on partially ordered metric spaces (see [5, 10, 11, 18, 22, 32, 33]). In 2006, Bhaskar and Lakshmikantham [13] initiated the idea of coupled fixed point and proved some interesting coupled fixed point theorems for mappings satisfying a mixed monotone property. In this continuation, Lakshmikantham and Ćirić [17] generalized these results for nonlinear ϕ-contraction mappings by introducing two ideas namely: coupled coincidence point and mixed g-monotone property. Thereafter Samet and Vetro [34] extended the idea of coupled fixed point to higher dimensions by introducing the notion of fixed point of n-order (or n-tupled fixed point, where n is natural number greater than or equal to 2) and presented some n-tupled fixed point results in complete metric spaces, using a new concept of F-invariant set. On the other hand, Imdad *et al.* [35] generalized the idea of n-tupled fixed point by considering even-tupled coincidence point besides exploiting the idea of mixed g-monotone property on X^n and proved an even-tupled coincidence point theorem for nonlinear ϕ-contraction mappings satisfying mixed g-monotone property.

The concept of partial metric space was introduced by Matthews [36] in 1994, which is a generalization of usual metric space. In such spaces, the distance of a point to itself may not be zero. The main motivation behind the idea of a partial metric space is to transfer mathematical techniques into computer science. Following this initial work, Matthews [36] generalized the Banach contraction principle in the context of complete partial metric spaces. For more details, we refer the reader to [4, 7–9, 20, 24–26, 37–48].