

C-CLASS FUNCTIONS ON SHORTER PROOFS OF SOME EVEN-TUPLED COINCIDENCE THEOREMS IN ORDERED METRIC SPACES

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ABSTRACT. The purpose of this paper is to prove some even tupled coincidence theorems for mappings with one variable in ordered complete metric spaces by using the concept of C -class functions. Our results generalize and improve several results in the literature.

1. INTRODUCTION

Ran and Reurings [30] extended the Banach contraction principle on ordered metric spaces for continuous monotone mappings with some applications to matrix equations. Thereafter Nieto and López [25] modified Ran and Reurings' fixed point theorem for an increasing mapping not necessarily continuous by assuming an another hypothesis on the ordered metric space and proved some fixed point theorems besides giving some applications to ordinary differential equations. In the same development, Nieto and López [26] analogously proved a fixed point theorem for a decreasing mapping on ordered metric space. In recent years, Nieto and López's [25] fixed point theorems were extended and refined by many authors ([1, 2, 7], [11]-[13], [18, 19, 24, 27]).

The idea of a coupled fixed point was introduced by Guo and Lakshmikantham [10] which was well followed by Bhaskar and Lakshmikantham [5] where the authors introduced the notion of mixed monotone property and proved some coupled fixed point theorems for weakly linear contractions enjoying mixed monotone property in ordered complete metric spaces. In [23], Lakshmikantham and Ćirić generalized these results for nonlinear contraction mappings by introducing the notion of coupled coincidence point and mixed g -monotone property.

Recently, Berzig and Samet [6] extended and generalized some fixed point results to higher dimensions. However, they used permutations of variables and distinguished between the first and last variables. Further, Roldán *et al.* [31] proved some existence and uniqueness theorems for nonlinear mappings of any number of arguments, not necessarily permuted or ordered. For more details see ([20, 31, 32, 33]).

Recently, Imdad *et al.* [16] extended the idea of mixed g -monotone property to the mapping $F : X^n \rightarrow X$ (where n is even natural number) and proved an even-tupled coincidence point theorem for nonlinear contraction mappings satisfying mixed g -monotone property. Basically their results are true for only even n but not for odd ones (for details see [14]-[17]). Very recently, Samet *et al.* [36] have shown that the coupled (analogously n -tupled) fixed results can be more easily obtained by using well known fixed point theorems on ordered metric spaces (see also [9, 28, 29]).

The concept of C -class functions was introduced by Ansari [3] which actually covers a large class of contractive conditions. In this paper, we generalize the results of Sharma *et al.* [37] by using the concept of C -class functions.

2. PRELIMINARIES

With a view to make, our presentation self-contained, we collect some basic definitions and needed results which will be used frequently in the text later.

2010 *Mathematics Subject Classification.* 47H10; 54H25.

Key words and phrases. partially ordered set; compatible mapping; mixed g -monotone property; n -tupled coincidence point; C -class function.