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Research Article

COMMON FIXED POINTS FOR EXPANSIVE MAPPINGS IN CONE B-METRIC SPACES

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ABSTRACT

In this paper, we establish some common fixed point and coincidence point theorems for expansive type mappings in the framework of cone *b*-metric spaces without assumption of normality. Our results in this paper extends and improves upon, the corresponding results of Zoran and Murthy[13]. *MSC*: primary 47H09, 47H10, 54H25.

INTRODUCTION

Banach contraction theorem is one of the most widely used fixed point theorems in all analysis. It has been generalised in many different directions by Mathematicians over the years. Bakhtin [2] introduced *b*-metric spaces as generalisation of metric spaces and proved contraction mapping principles in *b*-metric spaces that generalised the famous Banach contraction theorem. In contemporary time, fixed point theory has evolved in cone metric spaces equipped with partial ordering. The concept of cone metric space was introduced by Huang and Xian [2] where the set of real numbers is replaced by an ordered Banach space in the definition of metric. They introduced the basic definitions and some properties of convergence of sequences in cone metric spaces. They have proved some fixed point theorems of contracting mappings on complete cone metric spaces with assumption of normality of a cone. Thereafter various authors have generalised the result of Huang and Zhang and have studied fixed point theorems for normal and non normal cones [1,6,11,]. In [5], Hussin and Shah introduced cone *b*-metric spaces as a generalisation of *b*-metric spaces and cone metric spaces. Since then, several interesting fixed point results have been appeared in cone *b*-metric spaces.[8].

Expansive mappings in metric spaces were treated and respective fixed point results were obtained in [7,9,10,12]. Several authors have proved fixed point and common fixed point theorems for expansion mappings in the setting of cone metric spaces. Motivated by that we prove some common fixed point and common coincidence point theorems for expansive type mappings in the setting of cone *b*-metric spaces without the assumption of normality.

Consistent with Huang and Zhang [2], the following definitions and results will be needed in the sequel.

Definition *Let E be a real Banach space. A subset P of E is called a cone if and only if*

1. *P is closed, nonempty and* $P \neq \{0\}$;
2. $a,b \in R, a,b \geq 0, x,y \in P$ *imply that* $ax+by \in P$;
3. $P \cap (-P) = \{0\}$.

Given a cone $P \subset E$, we define a partial ordering $\leq$ with respect to P by $x \leq y$ if and only if $y-x \in P$. A cone P is called normal if there is a number $K>0$ such that for all $x,y \in E$,

$$0 \leq x \leq y \text{ implies } \|x\| \leq K\|y\| \quad (1)$$

The least positive number satisfying the above inequality is called the normal constant of P. We shall write $x<y$ to indicate

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