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SOME FIXED POINT THEOREMS FOR EXTENDED EXPANSION MAPPINGS ON CONE METRIC SPACES

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ABSTRACT

In this paper, we prove some fixed point theorems for expansion mappings in the framework of cone metric spaces. Our results in this paper extends and improves upon, among others, the corresponding results of Aage and Salunke [1]

MSC: *primary 47H09, 47H10, 54H25.*

Keywords: *Cone metric space, normal constants, fixed point.*

1. INTRODUCTION

One of the most widely used fixed point theorems in all analysis is Banach contraction theorem. It has been generalized in different directions by Mathematicians over the years. In contemporary time, fixed point theory has evolved speedily in cone metric spaces equipped with partial ordering. Huang and Zhang introduced in [5] the concept of cone metric space as generalisation of metric space where the set of real numbers is replaced by an ordered Banach space. Thereafter various authors have generlised the results of Huang and Zhang and studied fixed point theorems for normal and non-normal cones [2, 3, 6, 11]. A new generalisation of contraction mappings called T-contraction mappings was introduced by Beiranvand on metric spaces [4]. Recently Morales and Rojas [7], [8], [9], [10] have extended the concept of T-contraction mappings to the cone metric spaces by proving fixed point theorems for T-Kannan, T-Zamfirescu, T-Weakly contraction mappings.

Motivated by that we generalize the theorems given in [1] by extending the expansive mappings.

The following definitions and results will be needed in the sequel.

Definition 1: *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 $x, y \in E$,

$$0 \leq x \leq y \text{ implies } \|x\| \leq K\|y\| \tag{1}$$

The least positive number satisfying the above inequality is called the normal constant of P. We shall write $x<y$ to indicate that $x \leq y$ but $x \neq y$, while $x \ll y$ stands for $y-x \in$ int P (interior of P).

In the following we always suppose that E is a Banach space, P is a cone in E with int$P \neq 0$ and $\leq$ is partial ordering with respect to P.

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