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Cyclic Contractions And Fixed Point Theorems In Banach Spaces

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Abstract—In this manuscript we have proved the existence and uniqueness of some fixed point theorems for the cyclic operators defined in a closed subset of a Banach Space. Fixed point theorems for some contractions are introduced and given some examples.
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Keywords—Fixed Point, Contractive Mapping, Cylic Contraction, Banach Spaces

1. INTRODUCTION

In 2003 Kirk et.al introduced the notion of cyclic representation and characterized the Banach Contraction Principle in context of cyclic mapping.The theory of existence and uniqueness of fixed points has been developing since the work of Banach [9] in 1922 and numerous results have been obtained so far.Various types of cyclic contractions acting on complete metric spaces have been defined and studied thoroughly from this point of view[1]- [12].Now we extend our view to prove fixed point results for cyclic contraction in complete metric Spaces which generalize the results for cyclic contractions in Banach Space.

2. PRELIMINARIES

Definition 2.1[see (11)]
Let K be a subset of a Banach space X.An operator T defined on K is said to belong to the class D(p,q) if $\|Tx-Ty\| \le p\|x-y\|+q\{\|x-Tx\|+\|y-Ty\|\} \to (2.1)$ for all x and y in K,Where $0 \le p,q \le 1$ .If an operator T is in class D(k,0) with $0 < k < 1,$ then T is contraction with 0<k<1.

Definition 2.2
Let K_1 and K_2 be closed subsets of a Banach space X.An operator T defined on K is said to belong to the class D(p,q,r) if $\|Tx-Ty\| \le p\|x-y\|+q\{\|x-Tx\|+\|y-Ty\|\}+r\{\|x-Ty\|+\|Tx-y\|\}$ ----------(2.2) for all x and y in K,Where $0 \le p,q,r \le 1, p+2q+2r \le 1$ *and* $q > 0.$

Definition 2.3