FIXED POINT RESULTS IN SET $P_{h,e}$ WITH APPLICATIONS TO FRACTIONAL DIFFERENTIAL EQUATIONS

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Abstract. In this paper, without assuming operators to be continuous or compact, by employing monotone iterative technique on ordered Banach space, we at first establish new fixed point theorems for some kinds of nonlinear mixed monotone operators in set $P_{h,e}$. Then, we study a new form of fractional two point boundary value problem depending on a certain constant and give the existence and uniqueness of solutions. We also show that the unique solution exists in set $P_{h,e}$ or P_h and can be uniformly approximated by constructing two iterative sequences for any initial values. At the end, a concrete example is given to illustrate our abstract results. The conclusions of this article enrich the fixed point theorems and provide new methods to deal with nonlinear differential equations.

1. Introduction

In the past decades, one can observe a remarkable amount of interest for the development of fixed point theory, since it has a huge number of applications in engineering, mechanics, the nuclear industry, fluid dynamics, biological chemistry technology and elasticity, etc. It is worthy to mention the recent papers [9],