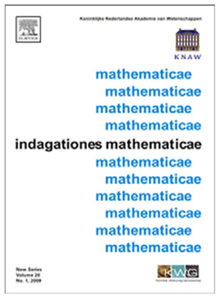
Accepted Manuscript



Optimum solutions for a system of differential equations via measure of noncompactness

M. Gabeleh, J. Markin

PII: S0019-3577(18)30025-9
DOI: https://doi.org/10.1016/j.indag.2018.01.008
Reference: INDAG 554

To appear in: *Indagationes Mathematicae*

Received date : 11 April 2017
Revised date : 13 December 2017
Accepted date : 22 January 2018

Please cite this article as: M. Gabeleh, J. Markin, Optimum solutions for a system of differential equations via measure of noncompactness, *Indagationes Mathematicae* (2018), https://doi.org/10.1016/j.indag.2018.01.008

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

*Manuscript
Click here to view linked References

Optimum solutions for a system of differential equations via measure of noncompactness

M. Gabeleh*, J. Markin †

Abstract. New classes of mappings, called cyclic (noncyclic) condensing operators, are introduced and used to investigate the existence of best proximity points (best proximity pairs) with the help of a suitable measure of noncompactness. In this way, we obtain some real generalizations of Schauder and Darbo's fixed point theorems. In the last section, we apply such results to study the existence of optimum solutions to a system of differential equations.

Key words: Best proximity point (pair); Cyclic (noncyclic) condensing operator; Optimum solution; System of differential equations
2010 Mathematics Subject Classification: 47H09, 49J27, 49A34

1 Introduction

Let X and Y be Banach spaces and K a subset of X. A mapping T from K into Y is said to be a *compact operator* provided that T is continuous and send any bounded set into a relatively compact one. It is worth noticing that in finite dimensional Banach spaces continuous mappings which are defined on closed sets are compact. In integral equations Fredholm and Volterra operators with sufficiently regular kernels are famous examples of compact operators on infinite dimensional Banach spaces (see [3] for other interesting examples of compact operators).
In 1930 Schauder proved that every compact self-mapping defined on a nonempty, bounded, closed and convex subset of a Banach space has a fixed point ([18]). Schauder's fixed point theorem is a very important tool to guarantee the existence of solutions of many nonlinear problems such as ordinary and partial differential equations.
The notion of *measure of compactness* was first introduced by Kuratowski ([13]) in connection with certain problems of General Topology. Darbo and Sadovkil used the concept of measure of compactness to extend Schauder's fixed point theorem to a wide class of operators, called *condensing operators* ([6, 17]). We mention that a condensing operator is a mapping under which the image of any set is in a certain sense more compact than the set itself. Recently, a great deal of study [1, 4, 5, 14, 19] has been made in connection with generalizations of Darbo's fixed point theorem in order to study the existence of solutions for various classes of functional integral equations.

Suppose A is a nonempty subset of a normed linear space X and T maps A into X. It is clear that the necessary (but not sufficient) condition for the existence of a fixed point of T is that the intersection of A and $T(A)$ is nonempty. If T does not have any fixed point, then the

*Corresponding author: Department of Mathematics, Ayatollah Boroujerdi University, Boroujerd and School of Mathematics, Institute for Research in Fundamental Sciences (IPM), P.O. Box 19395-5746, Tehran, Iran; gab.moo@gmail.com
†528 Rover Blvd., Los Alamos, NM 87544, USA; jmarkin@newmexico.com

Download English Version:

https://daneshyari.com/en/article/8906032

Download Persian Version:

https://daneshyari.com/article/8906032

Daneshyari.com