ON THE EXISTENCE OF SOLUTIONS FOR SOME MATRIX HIGHER ORDER DIFFERENTIAL INCLUSIONS*

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Abstract

The existence of solutions for Cauchy problems associated to a second order and a fourth order matrix differential inclusions is investigated. New results are obtained by using suitable fixed point theorems when the right hand side has convex or non convex values.

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keywords: differential inclusion, fixed point, decomposable values.

1   Introduction

This note is concerned with the following initial value problems

$$x'' - A^2 x \in F(t,x), \quad a.e. \ ([0,1]), \quad x(0) = x'(0) = 0, \qquad (1.1)$$

$$\begin{aligned} &x'''' - (B^2 + C^2)x'' + B^2 C^2 x \in F(t,x), \quad a.e. \ ([0,1]), \\ &x(0) = x'(0) = x''(0) = x'''(0) = 0, \end{aligned} \qquad (1.2)$$

where $F(.,.) : [0,1] \times \mathbf{R}^n \to \mathcal{P}(\mathbf{R}^n)$ is a set-valued map and $A, B, C \in \mathbf{R}^{n \times n}$ are given matrices.