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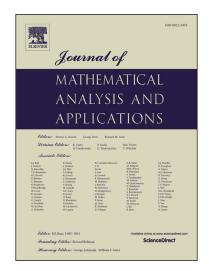
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Extremal solutions and strong relaxation for nonlinear multivalued systems with maximal monotone terms

Nikolaos S. Papageorgiou^a, Calogero Vetro^{b,*}, Francesca Vetro^c

Abstract

We consider differential systems in \mathbb{R}^N driven by a nonlinear nonhomogeneous second order differential operator, a maximal monotone term and a multivalued perturbation F(t, u, u'). For periodic systems we prove the existence of extremal trajectories, that is solutions of the system in which F(t, u, u') is replaced by extF(t, u, u') (= the extreme points of F(t, u, u')). For Dirichlet systems we show that the extremal trajectories approximate the solutions of the "convex" problem in the $C^1(T, \mathbb{R}^N)$ -norm (strong relaxation).

 $\label{thm:main} \textit{Keywords:} \quad \text{Maximal monotone map, differential inclusion, extremal trajectories, strong relaxation, bang-bang controls}$

2010 MSC: 34B15, 34C25, 47H06

1. Introduction

The starting point of our work in this paper is the following periodic system

$$\begin{cases} a(u'(t))' \in A(u(t)) + F(t, u(t), u'(t)) & \text{for a.a. } t \in T = [0, b], \\ u(0) = u(b), \quad u'(0) = u'(b). \end{cases}$$
(1)

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