

## NONLINEAR PERIODIC SYSTEMS WITH UNILATERAL CONSTRAINTS

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*Dedicated to the memory of Ioan I. Vrabie*

ABSTRACT. We consider a general periodic system driven by a nonlinear, nonhomogeneous differential operator, with a maximal monotone term which is not defined everywhere. Using a topological approach based on Leray–Schauder alternative principle, we show the existence of a periodic solution.

### 1. Introduction

In this paper, we study the existence of solutions for the following periodic system

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

In this problem,  $a: \mathbb{R}^N \rightarrow \mathbb{R}^N$  is a continuous, strictly monotone (hence maximal monotone too) map which satisfies certain polynomial growth conditions. As a special case, the differential operator  $u \rightarrow a(u)'$  incorporates the vector  $p$ -Laplacian  $u \rightarrow (|u'|^{p-2}u)'$ , where  $|\cdot|$  denotes the  $\mathbb{R}^N$  norm. However, we stress that  $a$  is not in general homogeneous. On the right-hand side of (P),

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