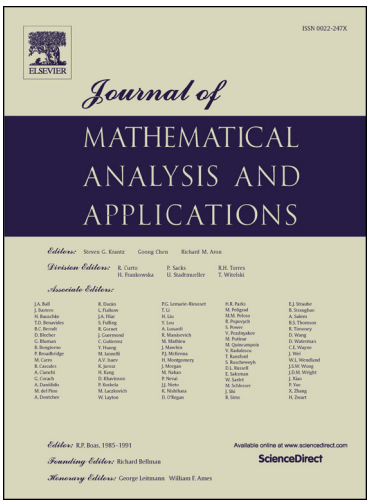
Accepted Manuscript



Noncoercive Hyperbolic Variational Inequalities with Applications to Contact Mechanics

Stanisław Migórski, Shengda Zeng

PII: S0022-247X(17)30532-2
DOI: http://dx.doi.org/10.1016/j.jmaa.2017.05.072
Reference: YJMAA 21433

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 8 March 2017

Please cite this article in press as: S. Migórski, S. Zeng, Noncoercive Hyperbolic Variational Inequalities with Applications to Contact Mechanics, *J. Math. Anal. Appl.* (2017), http://dx.doi.org/10.1016/j.jmaa.2017.05.072

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

Noncoercive Hyperbolic Variational Inequalities with Applications to Contact Mechanics *

Stanisław Migórski and Shengda Zeng †

Jagiellonian University in Krakow
Faculty of Mathematics and Computer Science
Chair of Optimization and Control
ul. Lojasiewicza 6, 30-348 Krakow, Poland

Abstract. In this paper we study a class of hyperbolic variational inequalities without a term depending on the first order derivative. Results on existence, uniqueness and regularity of a solution to the variational inequality are provided through the Rothe method. A frictional dynamic contact problem for viscoelastic material with noncoercive viscosity and subdifferential boundary conditions is studied as an illustrative application.

Key words. Variational inequality, operator inclusion, hyperbolic, Rothe method, frictional contact problem.

2010 Mathematics Subject Classification. 35L15, 35L86, 35L87, 74Hxx, 74M10.

1 Introduction

Variational inequalities arise in a natural way in many problems in partial differential equations, mechanics, control and optimization, and mathematical physics. In mechanics, variational inequalities express the principle of virtual work or power in their inequality form. The history of variational inequalities started with a static contact problem posed in 1959 by A. Signorini. It was G. Fichera who formulated this problem as a variational inequality and used this term for the first time. Over the years, variational inequalities have attracted increasing attention mainly due to its many applications in Mechanics and Engineering. In particular, the mathematical analysis of various contact models leads to the variational inequalities related with the convex potentials and convex unilateral constraints. References in the field include the monographs [1, 2, 8, 11].

* Project supported by the National Science Center of Poland under Maestro Project No. UMO-2012/06/A/ST1/00262.

† Corresponding author. E-mail address: zengshengda@163.com.

Download English Version:

https://daneshyari.com/en/article/5774506

Download Persian Version:

https://daneshyari.com/article/5774506

Daneshyari.com