

Nonsmooth analysis of a N degree of freedom system with unilateral contact

Huong LE THI, Université de Nice Sophia-Antipolis

Stéphane JUNCA, Université de Nice Sophia-Antipolis

Mathias LEGRAND, McGill University

The demand to utilise nonlinear structural components has been increasingly present in engineering applications. For instance, vibro-impacts system is a typical source of nonlinearity. We first consider a spring-mass model of two masses and two springs in which one mass is constrained with perfect reflection on a wall. The periodic solutions of such two degree-of-freedom (dof) systems are studied, and then generalized into N dof. We derived initial conditions which give solutions that exhibit sticking phases [?]. The existence ([?] [?] [?]) and the behavior ([?] [?] [?]) of these solutions are studied analytically and numerically.

Références

- [1] P. BALLARD, *Dynamique des systemes discrets avec liaisons unilaterales parfaites*, 21 ème Congrès Français de Mécanique, Bordeaux, 26 au 30 aout 2013.
- [2] P. BALLARD, *The Dynamics of Discrete Mechanical Systems with Perfect Unilateral Constraints*, Arch. Rational Mech. Anal. 154 (2000) 199-274.
- [3] S. HENG, *Nonlinear normal modes*, private report, McGill University.
- [4] S. JUNCA, M. LEGRAND, S. HENG, *Nonsmooth modal analysis of a N degree of freedom system with a purely elastic impact law*, preprint 2015.
- [5] S. JUNCA, M. LEGRAND, H. LE THI, *First return map for N dof vibro-impact systems*, in preparation.
- [6] S. JUNCA, M. LEGRAND, H. LE THI, *Nonlinear modes with one sticked phase*, in preparation.
- [7] D. LAXALDE, M. LEGRAND, *Nonlinear modal analysis of mechanical systems with frictionless contact interfaces*, Comput Mech (2011).
- [8] M. SCHATZMAN, *A class of nonlinear differential equations of second order in time*, Nonlinear Anal. 2 (1978), no. 3, 355-373.

Huong LE THI, Laboratoire J.A. Dieudonné, U.M.R. 6621 du CNRS Université de Nice Sophia-Antipolis Parc Valrose 06108 Nice Cedex 02, France; Coffee Team, INRIA Sophia-Antipolis Méditerranée
email: lethih@unice.fr

Stéphane JUNCA, Laboratoire J.A. Dieudonné, U.M.R. 6621 du CNRS Université de Nice Sophia-Antipolis Parc Valrose 06108 Nice Cedex 02, France; Coffee Team, INRIA Sophia-Antipolis Méditerranée
email: junca@math.unice.fr

Mathias LEGRAND, Department of Mechanical Engineering Room 270, Macdonald Engineering Bui, 817 Sherbrooke Street West Montreal, Quebec H3A 0C3
email: mathias.legrand@mcgill.ca