

COMPARISON OF NONSMOOTH TIME INTEGRATION SCHEMES FOR FRICTIONAL CONTACT PROBLEMS

Olivier Brüls and Javier Galvez Buezo

*University of Liège - Aerospace and Mechanical Engineering Quartier POLYTECH 1 allée de la
Découverte 9 4000 Liège Belgique*

Keywords: Nonsmooth contact dynamic, friction, time integration, Moreau-Jean, generalized-alpha scheme.

Abstract. This work presents a comparison between different formalisms for the transient simulation of nonsmooth dynamic mechanical systems composed of rigid bodies, kinematic joints and contact conditions. More precisely, we compare the Moreau-Jean method and the nonsmooth generalized-alpha scheme. Firstly, the methods are examined and afterwards a simple mechanism involving rigid bodies, hinges and frictionless contacts is simulated to compare the obtained results with different approaches. The Moreau-Jean method is not forced to satisfy the unilateral constraints at position level, therefore some penetration can be observed in the numerical solution. This drawback does not occur with the nonsmooth generalized-alpha method because constraints are imposed at position and velocity levels. Finally the formulation and the numerical behaviour of these methods for frictional contact problems are studied.