

REAL-TIME SIMULATION OF HAPTIC COLLISION BETWEEN NONLINEAR SOLIDS

D. González*, I. Alfaro*, C. Quesada*, E. Cueto*, F. Chinesta†

* Aragón Institute of Engineering Research (I3A). Universidad de Zaragoza
María de Luna s/n, 50018, Zaragoza, Spain
e-mail: {gonzal,iciar,cquesada,ecueto}@unizar.es, web page: <http://amb.unizar.es>

† EADS Corporate Foundation International Chair
GEM UMR CNRS – Ecole Centrale de Nantes
1 rue de la Noe, BP 92101, F-44321 Nantes cedex 3, France
Francisco.Chinesta@ec-nantes.fr

Keywords: Real time, model order reduction, proper generalized decomposition (PGD).

ABSTRACT

In this work a novel strategy for the real-time simulation of collision between non-linear deformable solids is presented. We use a PGD technology to generate computational vademecums or metamodels with the response solution, and employ the Voxmap Pointshell method for two deformable solids obtaining the response of the system for haptic feedback rates. These are in essence a pre-computed solution of a parametric model in which every possible situation during the on-line phase of the method has been considered through the introduction of the appropriate parameters and stored in memory as a set of vectors. Such a high-dimensional parametric model is efficiently solved by using Proper Generalized Decompositions (PGD). Finally this work presents the developed algorithm together with some examples of its performance.

REFERENCES

- [1] D. González, I. Alfaro, C. Quesada, E. Cueto, and F. Chinesta. Computational vademecums for the real-time simulation of haptic collision between nonlinear solids. *Comput. Methods Appl. Mech. Engrg.*, in press (2014).