An implicit Material Point Method applied to granular flows using an irreducible and mixed formulation

I. Iaconeta*, A. Larese* R. Rossi* E. Oñate*

* International Center for Numerical Methods in Engineering (CIMNE)
Universidad Politécnica de Cataluña
Campus Norte UPC, 08034 Barcelona, Spain
E-mail: iiaconeta@cimne.upc.edu, antoldt@cimne.upc.edu, rrossi@cimne.upc.edu,
onate@cimne.upc.edu Web page: http://www.cimne.com

ABSTRACT

In the current work an implicit version of the Material Point Method (MPM)[1, 2], implemented in Kratos Multiphysics platform [3, 4], is applied for the prediction of granular flows behaviour. A Drucker-Prager plastic model is used for the computation of inelastic finite deformations, while a hyper-elastic law is used in the elastic regime.

The present work demonstrates that, under the assumption of plastic incompressibility, a mixed formulation, where the primary variables are represented by displacement and pressure, leads to the evaluation of a correct strain field, unlike an irreducible formulation, where the displacement is the only independent variable.

Different validation examples are presented to assess the proposed methodology. Both 2 and 3 dimensional problems are taken into account to verify that the results can significantly improve when a mixed formulation is adopted.

REFERENCES

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