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# An LBB-stable tetrahedral finite element based on a Pseudo-Random Integration (PRI) method for finite strain von Mises elasto-plasticity

Eric FEULVARCH\*, Alexandre BRO SSE†, Yannick VINCENT††

\* Univ. Lyon, Ecole Centrale de Lyon, LTDS, UMR 5513 CNRS  
58 rue Jean Parot, 42023 Saint-Etienne cedex 2, France  
eric.feulvarch@enise.fr

† Framatome  
2 Rue Professeur Jean Bernard, 69007 Lyon, France  
alexandre.brosse@framatome.com

†† ESI Group  
Le Récamier, 70 Rue Robert, 69458 Lyon Cedex 06, France  
yannick.vincent@esi-group.com

## ABSTRACT

The aim of this work is to propose a new nodal treatment of the pressure for tetrahedral meshes devoted to finite strain von Mises elasto-plasticity. The approach proposed has the interest of being LBB-stable for P1-type discretization. Thus, the existence of an error estimate is ensured and there is no need for a stabilization technique. The pressure is assumed to be constant on nodal sub-cells whose size is defined by means of a pseudo-random number generator. In this way, the discretization for the pressure is 'out of sync' with the one used for the kinematics. Because of this non-coincident spatial decomposition, the inf-sup test proposed by Chapelle and Bathe [1] shows that the LBB condition can be ensured. Examples are presented to illustrate the relevance of the approach developed for Eulerian and Lagrangian formalisms.

## REFERENCES

- [1] Chapelle D., Bathe K.J., The INF-SUP test, Computers and Structures, Vol. 47, 537-545, (1993).