Séminaire du laboratoire PIMM

Jeudi 28 janvier 2021 à 13h30 sur Teams

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présentera dans le cadre du séminaire ses travaux intitulés :

Hemivariational continuum approach for granular solids with damage-induced anisotropy evolution

Mechanical behavior of materials with granular microstructures is confounded by unique features of their grain-scale mechano-morphology, such as the tension-compression asymmetry of grain interactions and irregular grain structure. Continuum models, necessary for the macro-scale description of these materials, must link to the grain-scale behavior to describe the consequences of this mechano-morphology. Here, we consider the damage behavior of these materials based upon purely mechanical concepts utilizing energy and variational approach. Granular micromechanics is accounted through Piola's ansatz and objective kinematic descriptors obtained for grain-pair relative displacement in granular materials undergoing finite deformations. Karush-Kuhn-Tucker (KKT) type conditions that provide the evolution equations for grain-pair damage and Euler-Lagrange equations for evolution of grain-pair relative displacement are derived based upon a non-standard (hemivariational) variational approach. The model applicability is illustrated for particular form of grain-pair elastic energy and dissipation functionals through numerical examples. Results show interesting damage-induced anisotropy evolution including the emergence of a type of chiral behavior and formation of finite localization zones.

Référence : Dmitry Timofeev, Emilio Barchiesi, Anil Misra, Luca Placidi. Hemivariational continuum approach for granular solids with damage-induced anisotropy evolution. MATHEMATICS AND MECHANICS OF SOLIDS, ISSN: 1081-2865, doi:10.1177/1081286520968149 (in press)