



## INVITED SESSION

### Particle Methods for Large Deformation Problems in Geomechanics

#### ORGANIZERS

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**Key words:** Particle Methods, Geotechnical Applications.

#### ABSTRACT

The objective of this Invited Organized Session is to bring together researchers and scientists to present and discuss particle-based computational techniques and/or meshless methods applied to geotechnical problems. Situations in which geomaterials are subject to large deformation processes, problems in saturated and unsaturated conditions involving fluid-structure interactions and Multiphysics couplings.

Problems subject to large displacement frequently involve contact with structures, they are ubiquitous: landslides, pilot installation, sampling, boring, drilling, to name a few.

This Invited Session is intended to provide an overview of the application of continuum numerical methods (using any particle or meshless discretization method, PFEM, DEM, SPH, MPM, LBM, FCM, EFG...) to simulate large deformation in geomechanics. We particularly welcome contributions dealing -but not limited to- nonlinear problems with Multiphysics couplings, industrial applications and the integration of numerical and experimental modelling.

#### REFERENCES

- [1] **J.M. Carbonell, Ll. Monforte, M. Ciantia, M. Arroyo, and A. Gens** (2022). Geotechnical particle finite element method for modeling of soil-structure interaction under large deformation conditions. *Journal of Rock Mechanics and Geotechnical Engineering*. Elsevier.
- [2] **Ll. Monforte, A. Gens, M. Arroyo, M. A. Mánica and J.M. Carbonell** (2021). Analysis of cone penetration in brittle liquefiable soils. *Computers and Geotechnics*. Elsevier. 134.
- [3] **X. Zhang, E Oñate, S. A. G. Torres, J. Bleyer and K Krabbenhoft** (2019). A unified Lagrangian formulation for solid and fluid dynamics and its possibility for modelling submarine landslides and their consequences. *Computer Methods in Applied Mechanics and Engineering*, 343, 314-338.