



## INVITED SESSION

### Particle-Based Methods for Oil & Gas Industry

#### ORGANIZERS

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#### ABSTRACT

Engineering problems in the oil and gas industry are very challenging, typically because of the uncertainties associated with the physical processes involved and the difficulty of understanding them properly. One could think of resorting to experimentation in order to learn more about the complex phenomena involved. However, running a single physical experiment typically requires months of work and the drilling of new wells, with the extra costs involved. On other occasions, such tests are simply impossible. Numerical simulations can thereby help engineers gain a lot of insight in such problems related with the oil and gas industry, especially whenever it becomes impractical to obtain extra information from reality.

As a result of the fast improvements in computer technology, numerical methods applied to oil and gas engineering have been emerging in the past two decades. Specifically, particle-based methods such as the Smoothed-Particle Hydrodynamics (SPH), the Discrete Element Method (DEM), the Material Point Method (MPM), and the Particle Finite Element Method (PFEM) have received a lot of attention recently because of their natural capability to model problems in which different physical entities can experiment multiple interactions.

The objective of this invited session is to present and discuss the latest advances in particle-based numerical methods that, regardless of their original motivation, can be used to solve problems of interest for the oil and gas industry.