

**IAS Seminar**

**Topic:** **Acceleration and Development of the Material Point Method on Emerging Computing Architectures**

**Speaker:** Sagar Dolas, Institute of Applied Mathematics, Delft University of Technology, The Netherlands

**Contents:** The material point method is one of the meshfree methods which discretizes a continuum body with finite set of material points in the original configuration that are tracked throughout the deformation process on the underlying grid. MPM algorithm naturally combines advantages of both Lagrangian and Eulerian formulation and avoids mesh distortion problem present in Lagrangian formulation and numerical diffusion due to non-symmetric convective terms present in Eulerian formulation.

In the industry project SIMON, the institute Deltares is working on simulating the driving of monopiles, steel tubes with diameters of up to 11 meters and length of more than 60 meters, into the seafloor for the construction of offshore wind farms. Doing such simulations will give a better understanding of underlying mechanical processes and accelerate installation process of monopiles.

The material point method proves to be an efficient and promising numerical technique for simulating large deformation problems in Geotechnical Engineering but poses huge computational challenges for simulations involving large number of material points and degrees of freedom. The currently implemented MPM code is capable of simulating complex soil behaviours, but suffers huge penalties in terms of data access pattern, data alignment and inefficient use of threads / processes in shared memory computing environment for almost all computational working loops.

**Time:** Tuesday, 21 March 2017, 10:30

**Venue:** GRS Lecture Room, building 16.15, room 2009