The Institute of Geotechnical Engineering (IGS) is offering a thesis with the topic:

Implementation of a semi-implicit two phase material point method

Material point method is a meshless method capable of capturing large deformation effects numerically. In recent years, the application of the material point method together with a scheme following the theory of porous media has been of interest to geotechnical engineers. To this end, a two-phase material point method code has been developed following explicit time integration scheme.

Although preferred for its computational efficiency, the inability of the explicit time marching scheme to capture the fluid incompressibility is acknowledged. The goal of this Thesis is to implement a new solver, a semi-implicit time integration scheme in the material point method based on projection method. A simple application to validate the model will be carried out. A comparison between the explicit and semi-implicit scheme will also be carried out. The Thesis is also offered together with a student assistantship position.

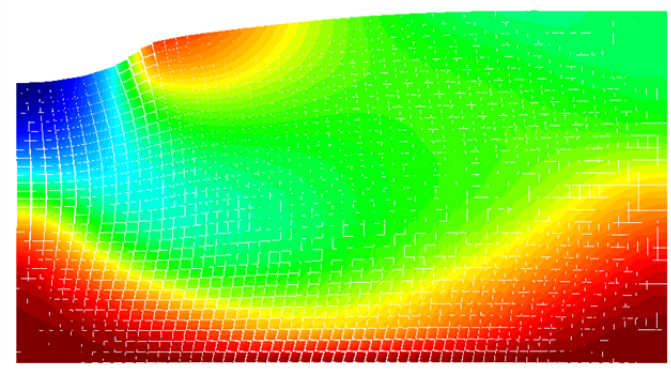

Figure 1: large deformation using the material point method

Targets:

- Literature survey of the semi-implicit method
- Implementation in simple FE routine, transfer to MPM
- Simple continuum test, comparison with explicit MPM

Contact: Shreyas Giridharan, M.Sc.; E-Mail: shreyas.giridharan@igs.uni-stuttgart.de