Effects of the MPM discretisations on the soil-structure problems

S. Fatemizadeh*, F. Hamad† and C. Moormann♣

* University of Stuttgart
Institute of Geotechnical Engineering (IGS)
Pfaffenwaldring 35, 70569 Stuttgart, Germany
e-mail: farzad.fatemizadeh@igs.uni-stuttgart.de, web page: http://www.uni-stuttgart.de/igs/

† University of Stuttgart
Institute of Geotechnical Engineering (IGS)
Pfaffenwaldring 35, 70569 Stuttgart, Germany
e-mail: fursan.hamad@igs.uni-stuttgart.de, web page: http://www.uni-stuttgart.de/igs/
e-mail: christian.moormann@igs.uni-stuttgart.de, web page: http://www.uni-stuttgart.de/igs/

♣ University of Stuttgart
Institute of Geotechnical Engineering (IGS)
Pfaffenwaldring 35, 70569 Stuttgart, Germany
e-mail: christian.moormann@igs.uni-stuttgart.de, web page: http://www.uni-stuttgart.de/igs/

ABSTRACT

Material point method (MPM) is a mesh based particle method which is suitable to simulate applications with large deformations. MPM adopts two discretisations, one is the space discretisation where the equation of motion is solved, and the other is the material discretisation where the continuum is replaced by material points or particles. Particles are allowed to move through the background computational mesh, which allows MPM to simulate large displacements and deformations of the material.

The effect of the spatial discretisation order on the simulation results have been studied by other authors (e.g. Andersen and Andersen 2010) considering only specific applications like bending of a cantilevered beam. More generally, the sensitivity of the MPM solution to the two discretisations specially when dealing with bench mark problems in the field of geotechnical engineering has not been studied so far, even though the application of the method in this area has been shown by many researchers (e.g. Jassim et al. 2011).

In this paper, the prominent problems in the field of geotechnical engineering are analyzed using MPM. In the case of available reference solutions the results are then compared to them. The effects of the two MPM discretisations on the quality of the final results have been investigated where some concluding remarks are presented.

REFERENCES