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Master Thesis Abstract of Muhammad Saad Bakhtiar

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Numerical investigation of hydraulic failure in excavations due to weakness in bottom sealing

Geotechnical Engineering often faces problems involving large deformation, dynamic behaviour and two phase materials. These large deformation problems like landslides, avalanches and failures in excavation can be dangerous for human life and economy. The numerical simulation is challenging if saturated soil is subjected to dynamic loading.

Development of urban areas usually requires deep excavations. These excavations may fail due to the seepage forces. Hydraulic heaving is one of the most important reasons of failure in excavations.

The intent of this master thesis is to numerically investigate these hydraulic failures in excavation by using Material Point Method (MPM). MPM is one of the suitable finite element methods to simulate these aforementioned geotechnical problems. MPM single point formulation is used for simulation of different model setups. These models were first validated with the existing experimental, numerical and analytical research.

Results are then obtained, visualized and interpreted in this thesis. Parametric study by using different parameters is also performed at the end. On the basis of literature study, results and parametric study the conclusion are drawn and documented in this thesis.