**Lehrstuhl für Statik**

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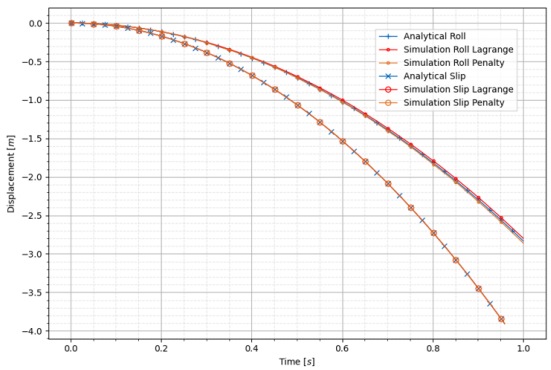
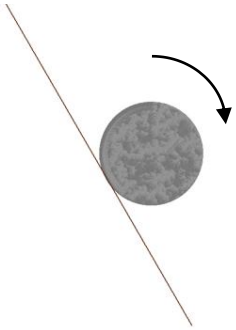
# Masterarbeit:

## Dirichlet boundary conditions in MPM with friction

The Material Point Method is a continuum based particle discretization method. It discretizes the body into Lagrangian moving particles which are carrying all history dependent variables. The governing equations however are solved at a stationary background grid, which covers the complete computational domain. This dual discretization leads to the necessity of mapping data from the material points to the nodes of the background grid and vice versa, which defines the classical MPM procedure. Boundary conditions can be applied directly at the nodes of the background grid which is similar to the FEM calculation procedure. However, as the material moves through the computational background grid the boundary condition should in general be imposed weakly using a Penalty approach for instance.



The current implementation of the Dirichlet boundary condition considers either fixed, slip or contact condition but the friction is neglected. Therefore within this thesis, first of all a general literature should be done to get familiar with the general workflow of MPM and the imposition of Dirichlet boundary conditions. Then the theory should be extended to include the effect of friction within conforming and non-conforming boundary conditions and that should be implemented into the open source Multiphysics platform KRATOS. The developed method should be validated for several engineering examples.
Basic programming experience in C++ and Python are essential for the proposed topic.

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Bearbeitungs-sprache: Deutsch oder Englisch
Starttermin: variabel