Chair for Computation in Engineering
Department of Geo, Civil and Environmental Engineering
Technical University of Munich

Modeling: ★★★☆☆
Mathematics: ★★☆☆☆
Programming: ★★★★★
Science: ★★☆☆☆

Software Lab:

A Finite Cell Method plugin for Rhino

Setting

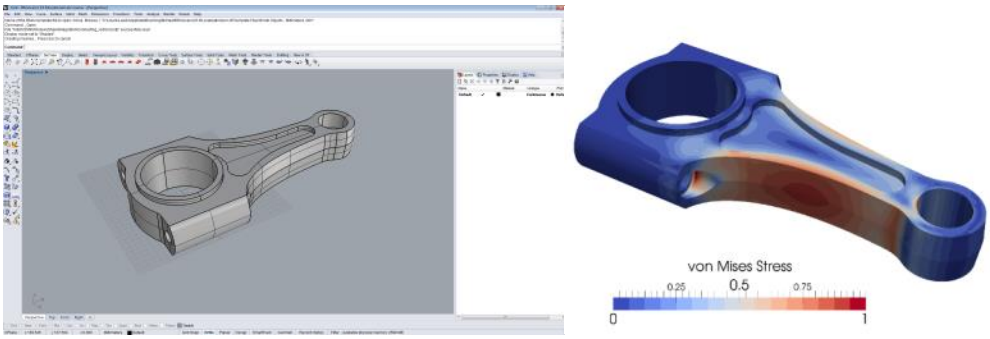
The Finite Cell Method (FCM) is an embedded domain approach for high order finite elements (pFEM). As such, it embeds the physical domain in a simple Cartesian mesh. The original geometry is recovered at the integration level using adaptive methods, which are easy to implement for Cartesian grids. Since the FCM utilizes high order FEM technology, it is robust against geometric distortions and can be very accurate even for non-smooth problems.

In recent years, the Chair for Computation in Engineering developed a flexible high order finite element framework that is also capable of performing finite cell computations. The goal of the project is to implement an interface between this in-house FEM code and the geometric modeler software Rhinoceros. This interface should allow for interactively setting up the parameters of an FCM computation (preprocessing), calling the FCM solver, and visualizing the solution (postprocessing).

Task

Create a Rhinoceros plugin that:

- allows users to set up a 3D linear structural analysis in Rhinoceros
- allows for calling the chair's new code AdhoC++, which computes the solution of the problem
- enables users to visualize basic results, such as displacements and stresses



Supervisors

László Kudela, Simulation in Applied Mechanics Group, laszlo.kudela@tum.de

References

[1] A. Düster, J. Parvizian, Z. Yang, E. Rank, The finite cell method for three-dimensional problems of solid mechanics, Computer Methods in Applied Mechanics and Engineering, pp. 45-48, 15 August 2008.

[2] D. Schillinger, A. Düster, E. Rank, The hp-d-adaptive finite cell method for geometrically nonlinear problems of solid mechanics, Numerical Methods in Engineering, 25 October 2011.