Chair for Computation in Engineering
Chair of Computational Modeling and Simulation

Software Lab:

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

Integrated Parametric Shaft Generator

Setting

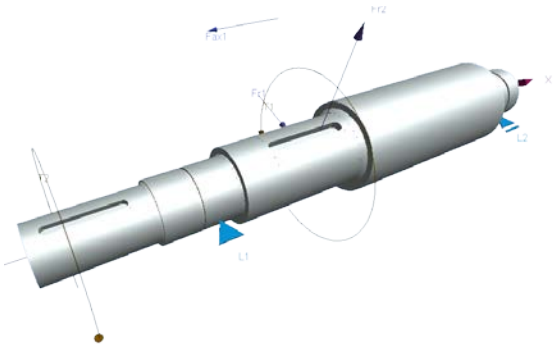
Parametric design of mechanical parts is a promising field, which offers great possibilities for fast prototyping and structural optimisation. A classic example is the design of shafts, which are frequently used in mechanical engineering. An important step in the development of new mechanical parts is the verification of structural integrity. A promising new approach is the recently developed Finite Cell Method (FCM), which directly operates on the parametric geometric model. To this end, the FCM embeds the original geometry in a possibly non-conforming Cartesian grid of higher order Finite Elements (p-FEM).

In the software lab the ideas of the FCM and parametric design shall be combined. For this purpose you will create an application that allows the user to parametrically define a shaft using a graphical user interface and run a mechanical simulation on the generated geometry.

Task

Create an application, which

- supports parametric design of drive shafts using simple section geometries
- allows to define loads and supports at selected faces
- runs an analysis using a provided FCM-framework
- visualize the results



Parametrically designed shaft [1]

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References

[1] "www.driveconcepts.de," [Online]. Available: http://www.driveconcepts.com/event.html. [Accessed 9 Jan 2012].

[2] J. Parvizian, A. Düster and E. Rank, "Finite Cell Method," *Computational Mechanics*, pp. 121-133, 03 April 2007.