**Lehrstuhl für Statik**
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# Masterarbeit:

## Geometric Non-Linear Beam Element Formulation with Cubic Hermite Splines

In a previous master thesis, a geometric non-linear Euler-Bernoulli beam element has been formulated in 2D discretized with cubic hermite splines. This parameteric representation of a curve not only uses the position of the start and end point, but also the tangent vectors at these for interpolation.

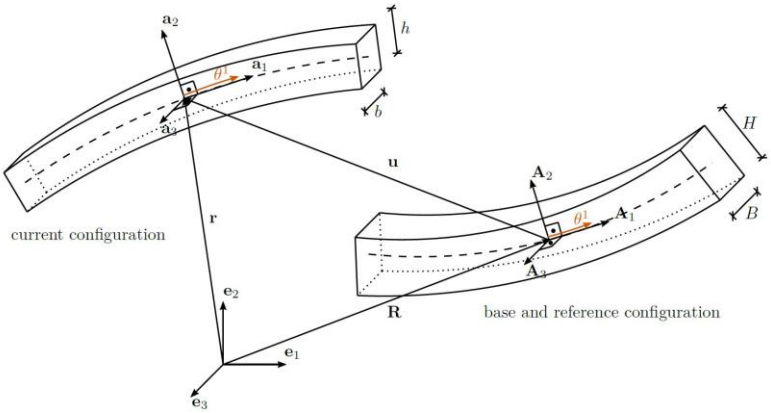


Figure 1: beam geometry

$$\boldsymbol{c}(\xi) = h_{00}\,\boldsymbol{P_0} + h_{10}\,\boldsymbol{m_0} + h_{01}\,\boldsymbol{P_1} + h_{11}\,\boldsymbol{m_1}$$

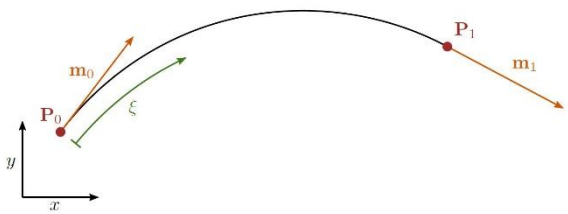

Figure 2: cubic Hermite spline

This discretization enables a versatile 2-node isoparametric element in a Total Lagrangian formulation, in contrast to the usual Corotational approaches used for non-linear beam elements.

In this thesis, the 2D formulation should be revisited and extended to 3D. Additionally, the treatment of geometric continuity and rotational boundary conditions shall be formulated. After successful implementations, the formulation shall be tested on meaningful examples.

Implementations could be carried out in Kratos Multiphysics. Basic knowledge in C++ and python are essential for a successful work with Kratos Multiphysics.

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Bearbeitungs-sprache: Deutsch oder Englisch
Starttermin: variabel