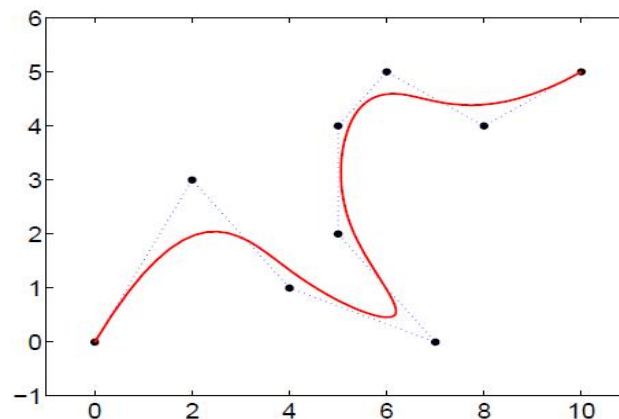


An Isogeometric Beam Element using B-Splines

Following the idea of isoparametric element formulations the isogeometric approach applies the basis functions of an exact geometry description also for the interpolation of the physical variables. For the Bernoulli-beam formulation classically cubic Hermite polynomials are used to interpolate the transverse displacements and its derivatives as approximations for the rotational degrees of freedom. Using B-splines allows a rotation free formulation for the Bernoulli beam.



Cubic B-Spline and control points

The aim of this project is the development, implementation and testing of an isogeometric Bernoulli beam analysis on the basis of B-splines.

Tasks

- Get familiar with B-spline interpolation
- Implementation of a B-spline interpolation
- Development and implementation of a beam element for isogeometric analyses into a given software framework
- Element check for completeness and continuity
- Implementation of test examples

Supervisors

Martin Ruess, ruess@tum.de, Dominik Schillinger schillinger@bv.tum.de
Chair for Computation in Engineering

References

- [1] Hughes, TJR Cottrell JA, Bazilevs Y. Isogeometric Analysis: CAD, finite elements, NURBS, exact geometry and mesh refinement. Comp. Meth, Appl. Mech. Engrg. 2004