Graz University of Technology

Institut für Geometrie

Gastvortrag

7.10.2014, 15:00 Uhr

Seminarraum 2, Kopernikusgasse 24

Optimal A Priori Discretization Error Bounds for Geodesic Finite Elements

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We prove optimal bounds for the discretization error of geodesic finite elements for variational partial differential equations for functions that map into a nonlinear space. For this we first generalize the well-known Cea lemma to nonlinear function spaces. In a second step we prove optimal interpolation error estimates for pointwise interpolation by geodesic finite elements of arbitrary order. These two results are both of independent interest. Together they yield optimal a priori error estimates for a large class of manifold-valued variational problems. We measure the discretization error both intrinsically using an H^1-type Finsler norm, and with the H^1-norm using embeddings of the codomain in a linear space. To measure the regularity of the solution we propose a nonstandard smoothness descriptor for manifold-valued functions, which bounds additional terms not captured by Sobolev norms. As an application we obtain optimal a priori error estimates for discretizations of smooth harmonic maps using geodesic finite elements, yielding the first high order scheme for this problem. *(This is joint work with H. Hardering and O. Sander)*

Johannes Wallner