Analysis-suitable T-splines

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Achieving high
fidelity numerical results across a wide spectrum of application areas depends strongly upon the analysis-suitable nature of the underlying geometry. Several examples, among many, include shells, contact, boundary layer phenomena, and model reduction techniques such as boundary elements. In these examples, the exact representation of smooth geometry is essential for correct solution behavior. Additionally, in design, properly formulated geometry eliminates the possibility of producing dirty geometry that greatly hampers downstream analysis operations and prevents integrated and efficient design-through-analysis. In this talk, an emerging class of splines, capable of meeting the disparate demands of design and analysis, called analysis-suitable T-splines, will be described. Analysis-suitable T-splines (ASTS) inherit the geometric design flexibility of T-splines while providing the rich mathematical structure needed by analysis. A simple character- ization of ASTS will be given and several of the most important mathematical properties of the resulting spline spaces will be reviewed. Additionally, their use as a basis in isogeometric design and analysis in several demanding application areas will be presented.