Technion-Israel Institute of Technology

Computer Science Department

Center for Graphics and Geometric Computing

CGGC Seminar

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Volumetric T-spline Parameterization for Isogeometric Analysis

As a new advancement of traditional finite element method, isogeometric analysis (IGA) was proposed to integrate design and analysis. In this talk, I will present our latest research on volumetric T-spline parameterization for IGA applications. For arbitrary-topology objects, we first build a polycube whose topology is equivalent to the input geometry and it serves as the parametric domain for the following trivariate T-spline construction. Boolean operations, geometry skeleton and centroidal Voronoi tessellation based surface segmentation can also be used to build polycubes with surface features preserved. A parametric mapping is then used to build a one-to-one correspondence between the input geometry and the polycube boundary. After that, we choose the deformed octree subdivision of the polycube as the initial T-mesh, and make it valid through pillowing, quality improvement, and applying templates or truncation mechanism couple with subdivision to handle extraordinary nodes. Weighted and truncated T-spline basis functions are derived to satisfy the requirements of analysis-suitable T-splines, including partition of unity and linear independence. The parametric mapping method has been further extended to conformal solid T-spline construction with the input surface parameterization preserved, and also been incorporated into commercial software such as Rhino and Abaqus.

Bio:

Yongjie Jessica Zhang is an Associate Professor in Mechanical Engineering at Carnegie Mellon University with a courtesy appointment in Biomedical Engineering. She received her B.Eng. in Automotive Engineering, and M.Eng. in Engineering Mechanics, all from Tsinghua University, China, and M.Eng. in Aerospace Engineering and Engineering Mechanics, and Ph.D. in Computational Engineering and Sciences from the University of Texas at Austin. Her research interests include computational geometry, mesh generation, computer graphics, visualization, finite element method, isogeometric analysis and their application in computational biomedicine, material sciences and engineering. She has co-authored over 130 publications in peer-reviewed journals and conference proceedings. She is the recipient of Presidential Early Career Award for Scientists and Engineers, NSF CAREER Award, Office of Naval Research Young Investigator Award, USACM Gallagher Young Investigator Award, Clarence H. Adamson Career Faculty Fellow in Mechanical Engineering, George Tallman Ladd Research Award, and Donald L. & Rhonda Struminger Faculty Fellow.

The lecture will be held on Sunday, 29.05.2016, at 15:00, Taub 401

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