Dr. Xiaohu Guo, University of Texas at Dallas

Title: Surface and Volumetric Mapping for Shape Modeling and Analysis

Abstract:
Geometric mapping for two surfaces or solids establishes a one-to-one smooth correspondence between them. It finds its applications in shape registration and analysis, shape retrieval, information reuse, and material/texture transplant. In this talk, I will present our ongoing work on surface and volumetric mappings, which consists of a globally optimal quasi-conformal surface mapping framework and harmonic volumetric mapping based upon surface mapping. The quality of surface mapping is typically measured in terms of angle and area distortion. Founded upon the intrinsic geometry structure of surfaces, our quasi-conformal surface mapping framework will globally minimize the stretching energy inevitably introduced between two different surfaces with the same topology. Despite the necessity of surface mapping, interior volume data carries abundant information including material, density, etc. Harmonicity of the volumetric mappings essentially characterizes smoothness, which is a natural phenomenon that depicts the minimized physical energy configuration that arises from the difference between two shapes. Given a surface mapping between two solids, the volumetric (interior) mapping is derived by solving a linear system constructed from a boundary method called the fundamental solution method. Throughout the talk, I will demonstrate the utility and efficacy of our surface and volumetric mapping algorithms in shape registration, surface morphing, shape analysis, information reuse, deformation sequence analysis, tetrahedral remeshing and solid texture synthesis.

Bio: Xiaohu Guo is an assistant professor in the Department of Computer Science at University of Texas at Dallas. He received his Ph.D. degree in Computer Science from the State University of New York at Stony Brook in 2006, and a B.S. degree in Computer Science from the University of Science and Technology of China in 2001. His research interests are focused on geometric and physically-based modeling, animation and simulation. His research is currently supported by National Science Foundation (NSF). For more details, please visit http://www.utdallas.edu/~xguo