数学与系统科学研究院

计算数学所学术报告

报告人：Prof. Uri Ascher

（ Dept. of Computer Science, University of BC, Vancouver ）

报告题目：

Physics-based soft object deformation: model calibration and motion simulation

邀请人： 孙雅娟 研究员

报告时间：2016 年 7 月 9 日（周六）

上午 11:00-12:00

报告地点： 科技综合楼三层

311 报告厅

Abstract:

Motion simulation of soft objects such as cloth, plants and some body parts is ubiquitous in computer graphics and robotics applications. The governing elastodynamics PDE system is often discretized in space already at the variational level, using FEM. This leads to a large, expensive to assemble, ODE system in time, where the damped motion may mask highly oscillatory stiffness.

The model described by the differential system must be calibrated first. We present a data-driven method for this inverse problem. An iterative splitting framework is adopted that consists of one component for physicsbased deformation tracking and another for spacetime optimization of a set of deformation parameters including Young's moduli and damping coefficients. Low cost depth sensors are used for the deformation capture, and we do not require any force-displacement measurements, thus making the data capture a cheap and convenient process. A state-of-the-art probabilistic tracking method is augmented to robustly handle noise, occlusions, fast movements and large deformations. The spacetime optimization aims to match the simulated trajectories with the tracked ones. The optimized deformation model is then used to boost the accuracy of the tracking results, which can in turn improve the deformation parameter estimation itself in later iterations. Numerical experiments demonstrate that the tracking and parameter optimization components complement each other nicely.

A semi-implicit time integration method is employed, and this introduces artificial damping. I will show a simple analysis of this effect and discuss its implications. Our results shall all be demonstrated, of course.

This talk is based on joint works with BinWang, LonghuaWu, KangKang Yin, Libin Liu & Hui Huang ('15), and Edwin Chen & Dinesh Pai ('16).

欢迎大家参加！