

Title: Interactive Physically-Based Simulation

Abstract: Visually realistic simulation of physical systems has become an important part of many computer graphics applications. For several such applications, including training simulators and games, performing calculations at interactive rates is especially important. We would like to have systems that can respond to user input in a physically-believable fashion, at a rate sufficient to allow a user to interact with the system as it develops.

This talk will present a number of techniques developed in the context of our group's ongoing work in interactive simulation for graphics applications. Among the techniques that will be discussed will be:

- Multi-representation object models, for combining different object characteristics in a single simulation
- Particle-based simulations of more complex phenomena
- Simulation-guided deformations
- The use of lower-resolution simulation to guide higher-resolution simulation
- The use of level-of-detail simulations We will present application of these methods to a variety of problems, including graphical simulations of fire, plant motion, wave behavior, and change in object composition.

Bio:

John Keyser is an Associate Professor in the Department of Computer Science at Texas A&M University. He received his Ph.D. in Computer Science from the University of North Carolina (Chapel Hill) in 2000, and B.S. degrees in Engineering Physics, Applied Mathematics, and Computer Science from Abilene Christian University in 1994. His research interests, broadly encompassing graphics, are specifically focused on issues of geometric and physically-based modeling. Current research projects focus on robust solid modeling calculations using computer algebra, geometric reconstruction and visualization of scanned neuron data, and physically-based modeling and simulation for computer graphics applications.