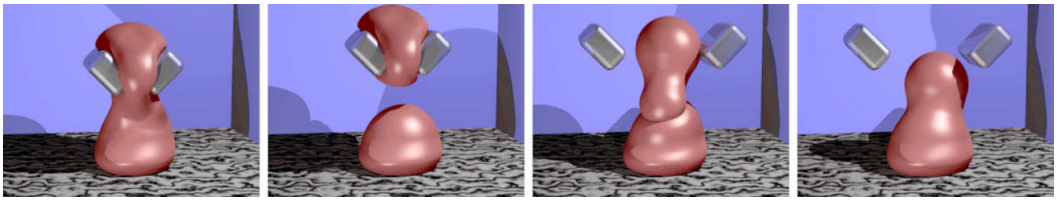
Caltech
Department of
Computer
Science

Computer Graphics Seminar Series

Monday,
February 2nd, 4pm
Jorgensen 74



Animation of Highly Deformable Materials

Mathieu Desbrun, PhD
iMAGIS, Grenoble

In this talk, computer graphics modeling and animation of highly deformable materials will be presented. Our work is aimed at creating virtual physically-based models of matter, able to automatically deform due to interactions with the environment. Coping with large deformation is known to be time consuming, so efficiency and visual quality are the key issues as they can open avenues such as surgery simulation or virtual reality in general.

After a review of previous related work, we present a hybrid model for highly deformable materials that combines implicit surfaces and a particle system. It results in a global model that gathers the advantages of the two approaches, as well as other valuable properties such as volume preservation.

Then we discuss conventional particle system weaknesses. An alternative model is proposed allowing a space-time adaptive simulation, where particles can subdivide to better discretize fast deforming areas, or merge to simplify stable regions. Computations are therefore stable and optimized as discretization is automatically adapted.

Lastly, an active implicit skin model is introduced. This deformable surface can coat any deformable model both providing a neat visualization and conferring physical properties such as surface tension. More generally, it offers an efficient and low-cost technique to visualize adaptive models, avoiding "popping" effects through smoothing of sudden internal change of granularity.

Hosted by: Multi-Res Modeling Group