Course Schedule

8:30 am Introduction

8:45 am Differential Equation Basics Witkin
Vector fields and integral curves; initial value problems; basic numeri
modular implementation of differential equation solvers.

9:30 am Particle Dynamics Witkin
F=ma; phase space; basic forces; drag; springs, etc.; Simple pa
sions; structured implementation of interactions; mass-and-spring sy

10:15 am Break

10:30 am Rigid Body Dynamics I Baraff
Center of mass and inertia tensor; orientation and angular velocity; for
Newton's laws; rigid body equations of motion; rigid body sim

11:15 am Constrained Dynamics Witkin
"Tinkertoy" systems: rigid rods instead of springs. Using constraint
stiffness; Lagrange multipliers: solving for constraint forces. basics of c
contact.

12:00 pm Lunch

1:30 pm Implicit Methods and Cloth Simulation Kass/Baraff
Penalty methods: trying to use springs as constraints; The problem of
alizing the problem; how to avoid it; what to do if you can't; Simulati

2:30 pm Collision Detection Baraff/Kass
Point-volume comparisons, convex polyhedra, coherence based met
ods, curved surfaces.

3:00 pm Rigid Body Dynamics II Baraff
Impulses, resting contact, friction, discontinuities.

3:45 pm Break

4:00 pm Tips, tricks, and hacks Witkin/Baraff/Kass
Practical advice on using physically based techniques: making simulatio
outtakes and bloopers; common pitfalls.

Contents