Physically-Based Simulation
Cloth in the Wind

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Recap - Inspiration
Recap - Overview

- Soft-body Cloth Simulation with Variable Wind
- Mass-Spring System
Recap - Variability

- Flexibility in constraints of fixed points in cloth
  - 2 points as in a flag
  - 3 points as in a sailboat

- Material type of cloth
Milestone Results
Milestone Progress

- Successfully implemented 2-D cloth simulation with
  - Gravity
  - Direct-neighbor constraints
  - 2-D World

- Still remaining
  - Variable Wind Forces
  - 2-distance and 3-distance neighbor constraints
  - 3-D World
  - Stability in overlap/edge-cases
Milestone Issues
Final - Features

- 3D physical simulation (Verlet integration) and constraint solving
- Dynamic point fixing / unfixing
- Cloth self-collision
  - Particle-Particle (Cheap, Inaccurate)
  - Particle-Face (Expensive, Accurate)
  - Impulse-based cloth self-collision response
- Real-time / near-real-time
- 1-neighbor and 2-neighbor constraints
- Live Rendering and Interaction
Final - Basic Results
Final - Interaction Results
Final - Issues

- Doesn't scale well for denser cloth resolution (more fine-grained particles)
  - Needs acceleration structure with support for dynamically rebuilding on changes

- Not perfectly physically accurate in terms of physical quantities

- Self collision is unstable and inefficient
  - Doesn’t work perfectly for larger timesteps or very fast moving cloth
  - Have to tradeoff between cheaper particle-particle collision detection and more expensive particle-face collision detection