

# 头发模拟

2021/05

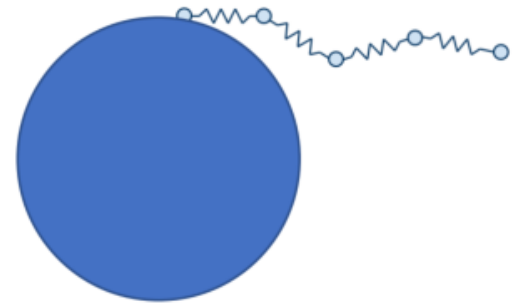
# 头发模拟

- Model
  - Mass-Spring system



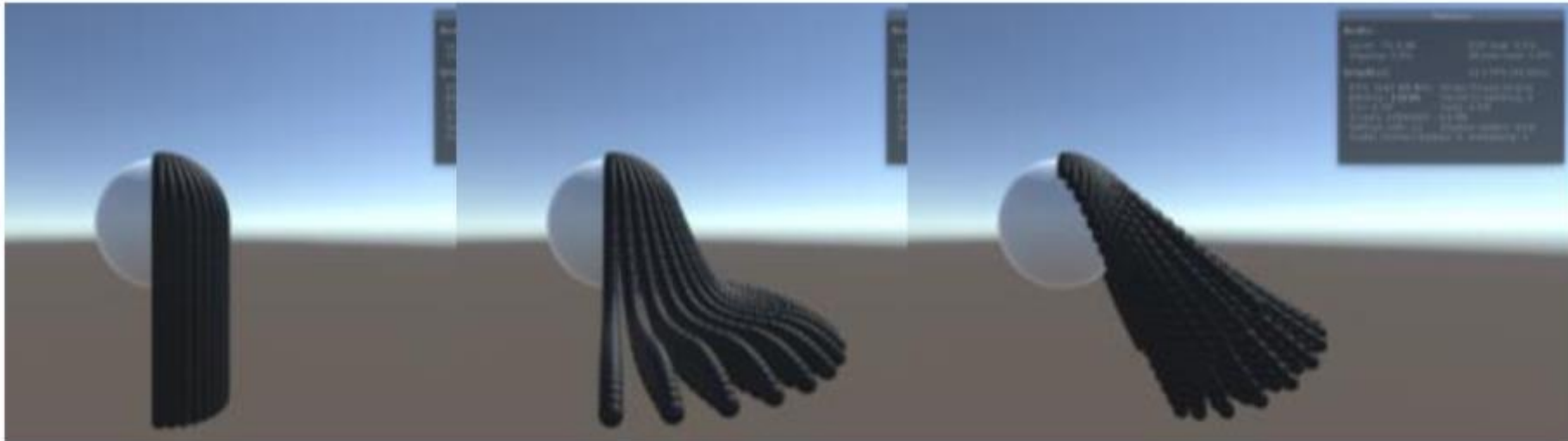
# 头发模拟

- Verlet Integration with damping
  - $X(t + \Delta t) = x(t) + d \cdot (x(t) - x(t - \Delta t)) + a(t)\Delta t^2$
- Spring constraint
  - $x' = x_1 + (x_2 - x_1) \cdot \frac{\|x_2 - x_1\| - l_r}{2\|x_2 - x_1\|}$
- Collision constraint
  - Collision with sphere
- Relaxation method



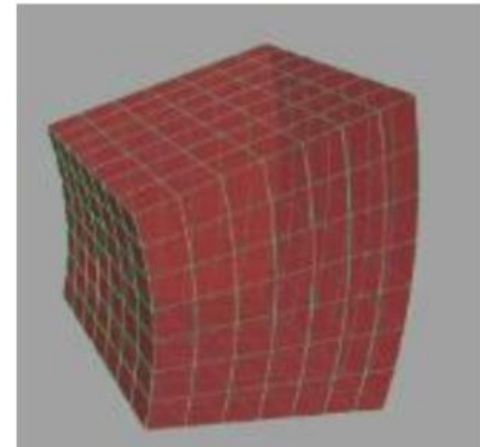
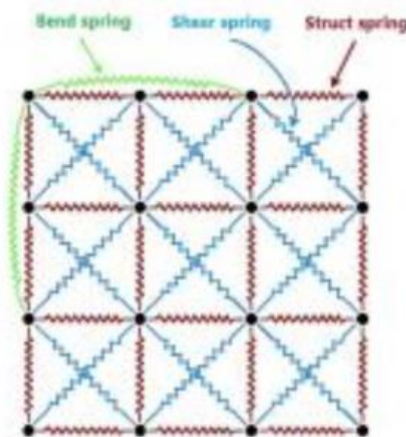
# 头发模拟

- Interaction requirement
  - Adjust the mass / rest length / the number of hairs with UI
  - Move / rotate / head with mouse / keyboard
  - Show frame rate on screen



# 头发模拟

- Bonus
  - Implicit solver
  - Hair rendering
  - Cloth / Jelly Cube simulation



# 作业内容

- 头发模拟
  - Verlet method
  - Interaction requirements
  - Add into your game
- Bonus
  - Hair rendering
  - Implicit solver
  - Multi-dimension spring constraint / cloth simulation / Jelly Cube simulation