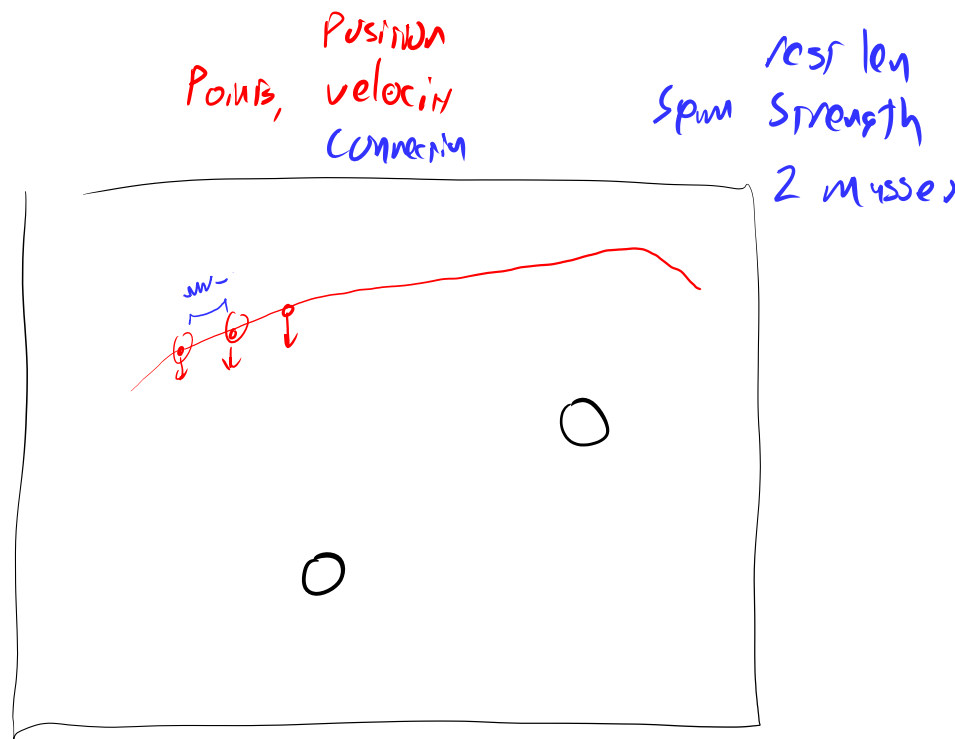
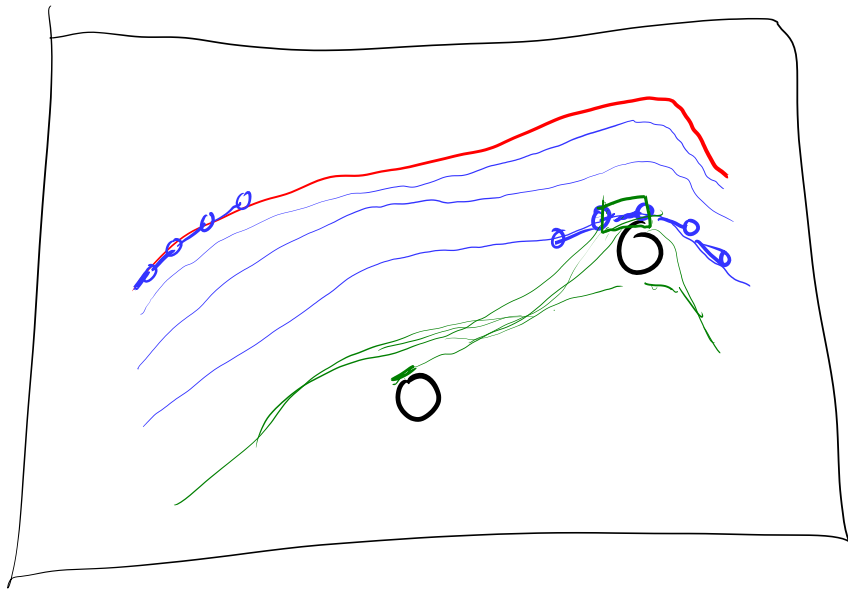


String in a 2D world



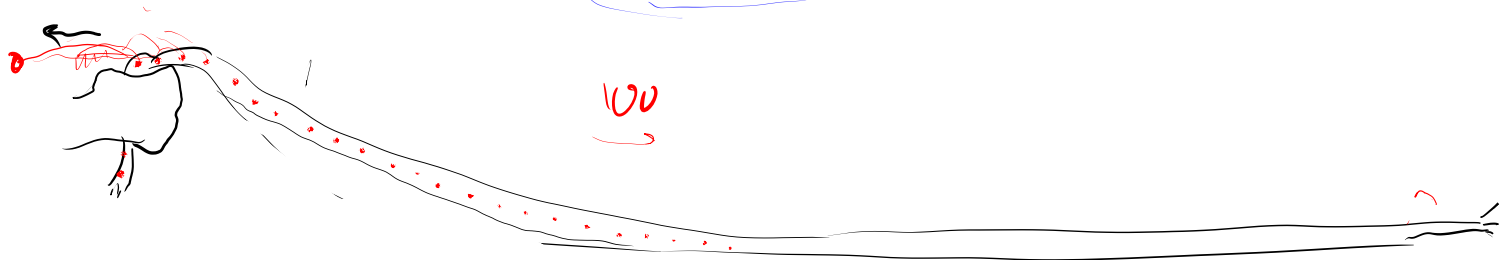
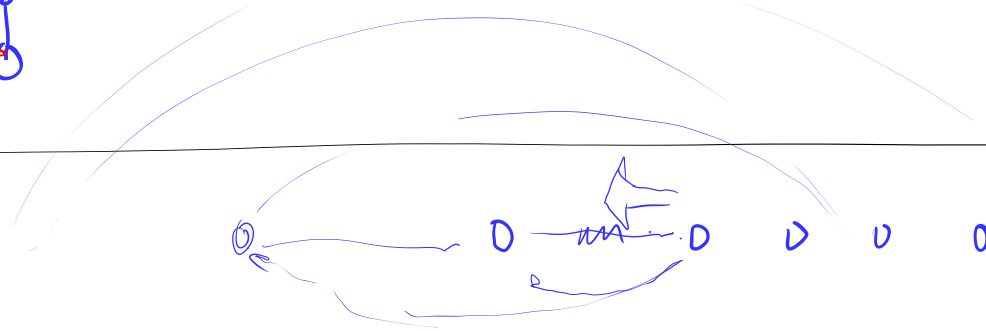
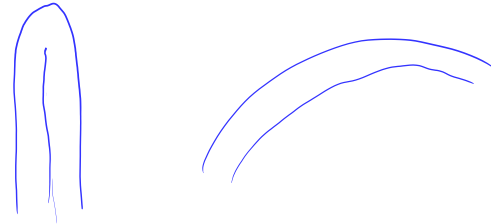
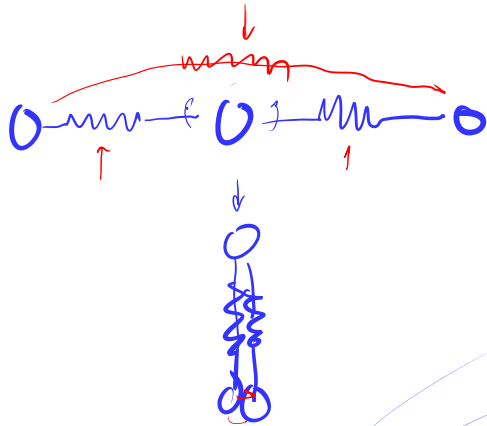
mass - spring

$$\vec{F} = m\vec{a} \quad \vec{a} = \frac{\vec{F}}{m}$$

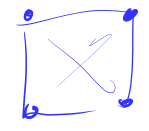
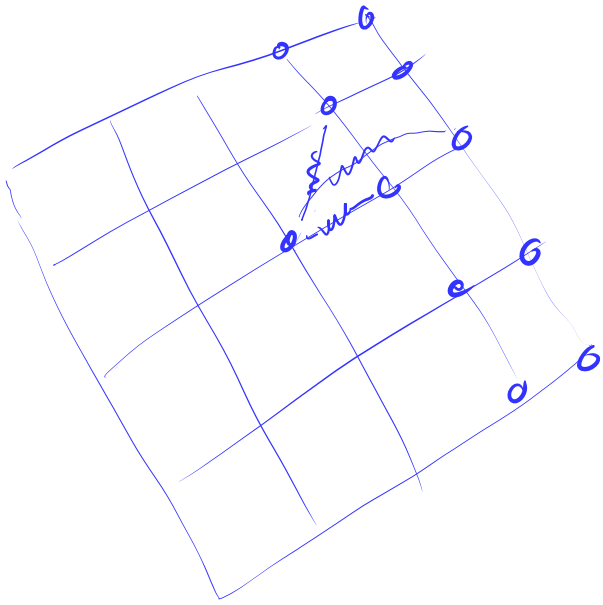
$$\frac{\Delta \vec{v} = \Delta t \vec{a}}{\Delta \vec{x} = \Delta t \vec{v}}$$



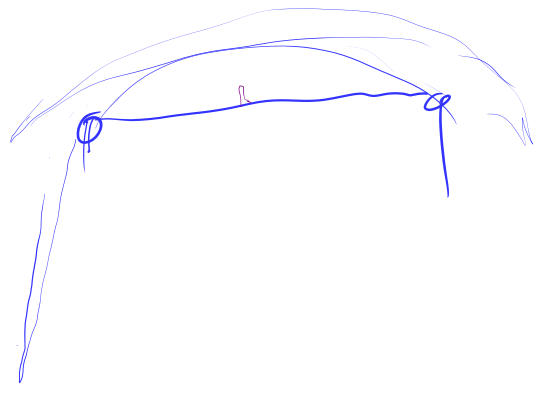
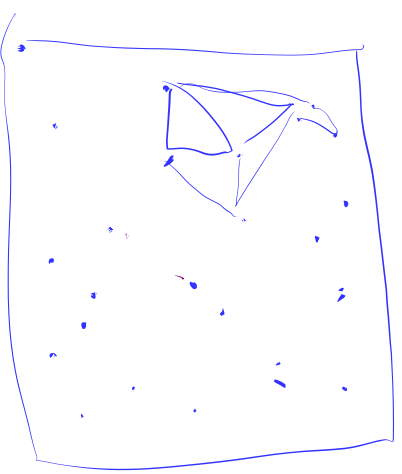
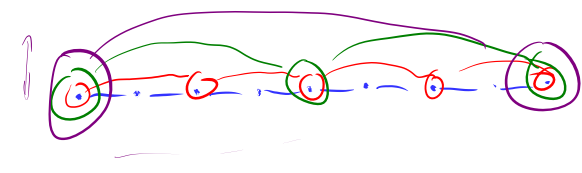
Strings are stiff



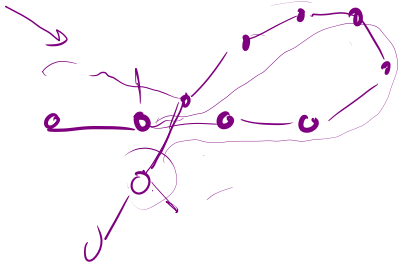
Cloth



multigrid



self intersection



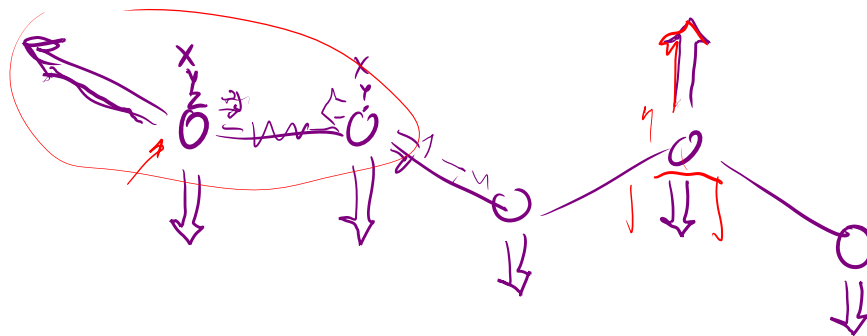
wind



$$\vec{F} = m\vec{a}$$

$$\vec{F}(\vec{x})$$

$$F_{\text{all}}(x_{\text{all}})$$



is pos
is vel

Jacobian (Error)

$$\begin{bmatrix} \omega & \omega \\ J \\ 0 \end{bmatrix} \begin{pmatrix} x \\ x \\ v \\ v \end{pmatrix} = 0$$

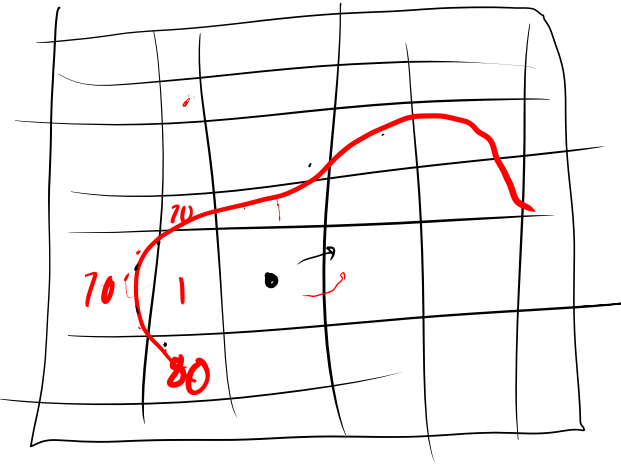
nice matrix

- Sparse
- Symmetric positive definite

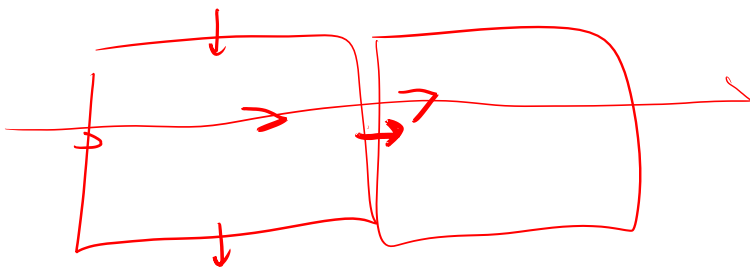
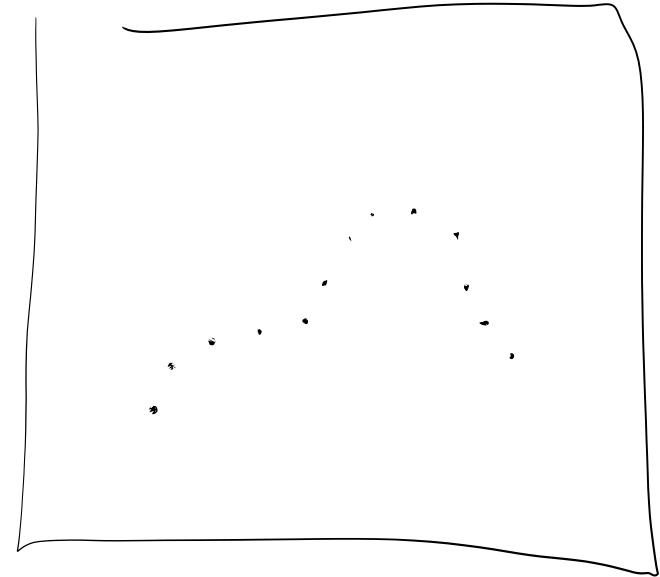
Particle Systems Effects



Lagrangian



Eulerian



Tradeoff

Quality

Efficiency

Simplicity (bars)