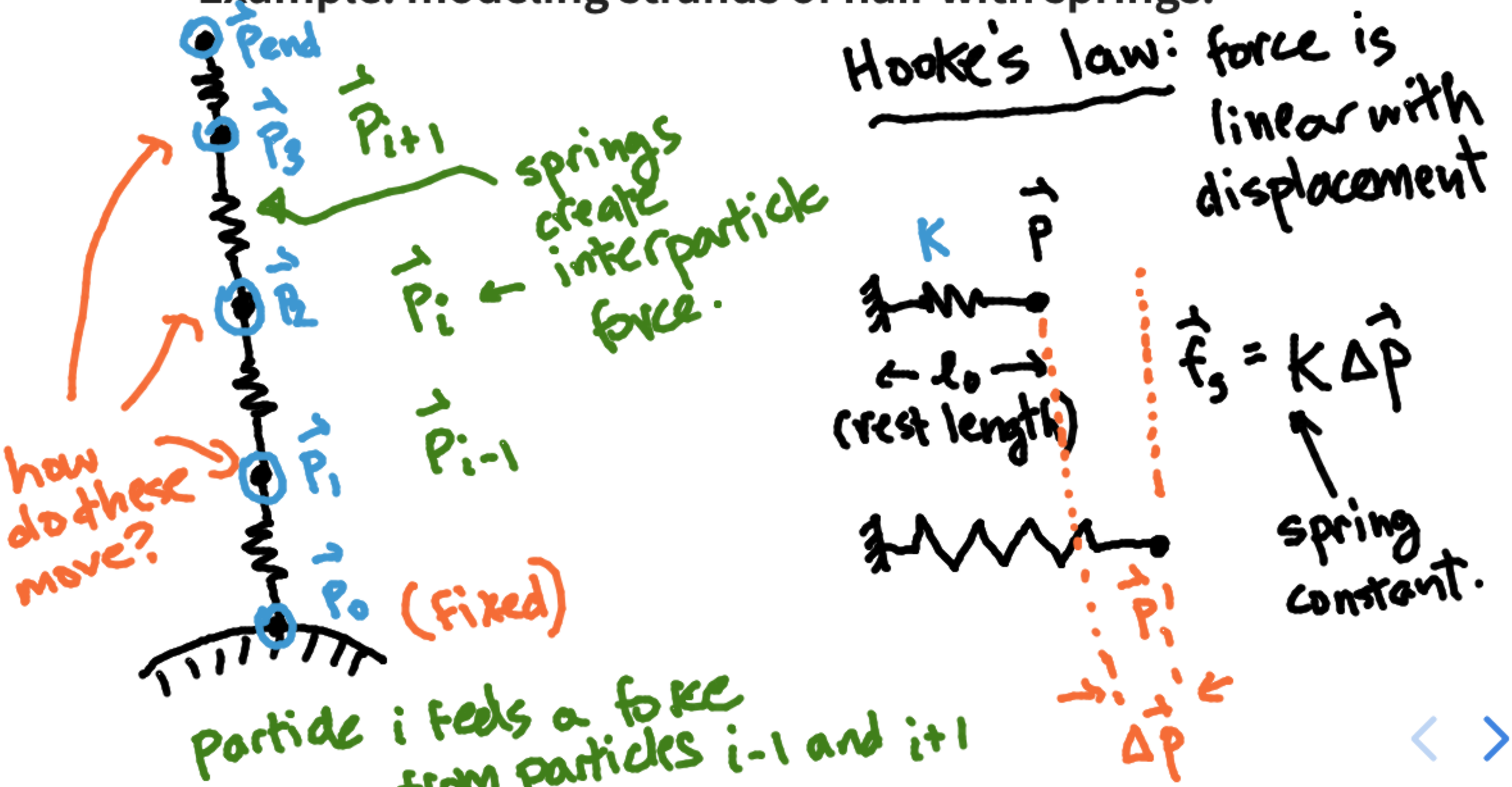
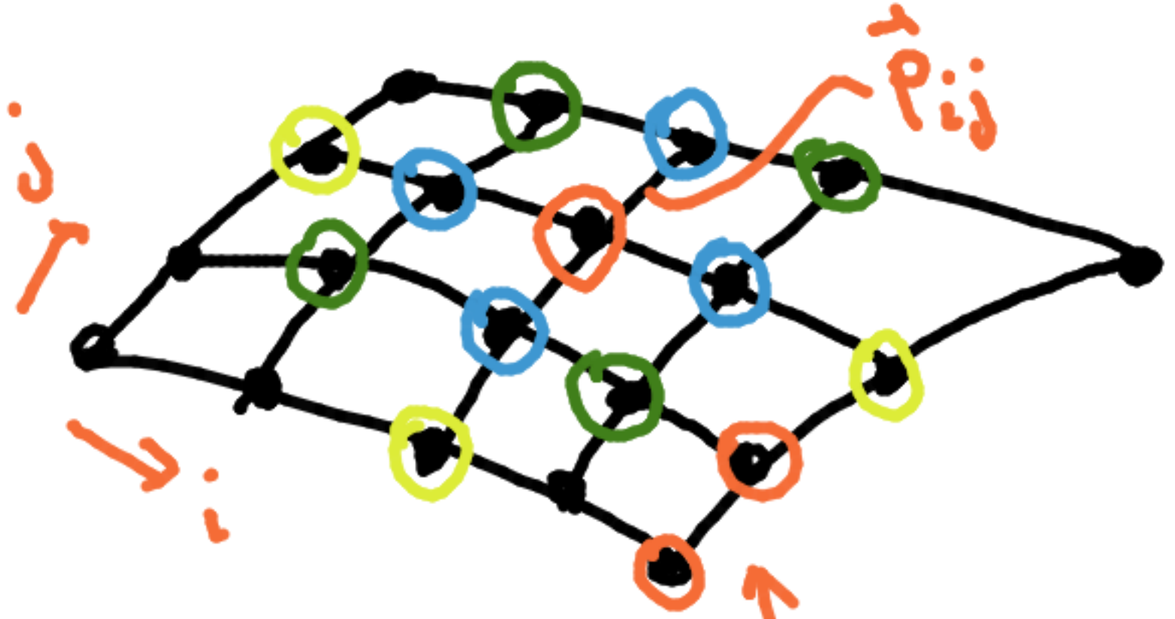
Example: modeling strands of hair with springs.



The same idea applies to modeling cloth - but more complicated with bookkeeping for 2d connections.



tension/compression

shear / torsion

bending

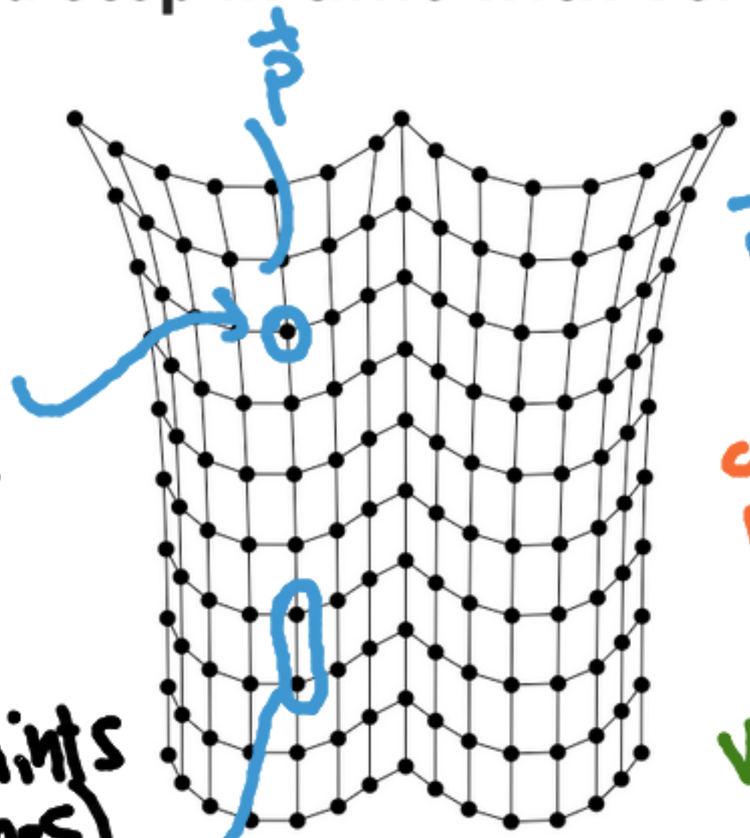
what to do here??

boundary condition

A simpler way to model cloth: model particles + constraints and step in time with Verlet integration.

2 stages

Stage 1: updating points from external forces



$$\vec{p}^{\,k+1} = 2\vec{p}^{\,k} - \vec{p}^{\,k-1} + \frac{\sum \vec{f}_{ext}\,\Delta t^2}{m}$$

$\vec{p}^{\,k+1}$: next step

$\vec{p}^{\,k}$: current position

$\vec{p}^{\,k-1}$: previous position.

m: mass

constant

Verlet integration.

Stage 2: update constraints (springs)

a) calculate δ (displacement of spring)

$$\vec{p}' = \vec{p} + \alpha_p\left(\vec{q} - \vec{p}\right)\frac{\delta}{2}$$

$$\vec{q}' = \vec{q} - \alpha_q\left(\vec{q} - \vec{p}\right)\frac{\delta}{2}$$