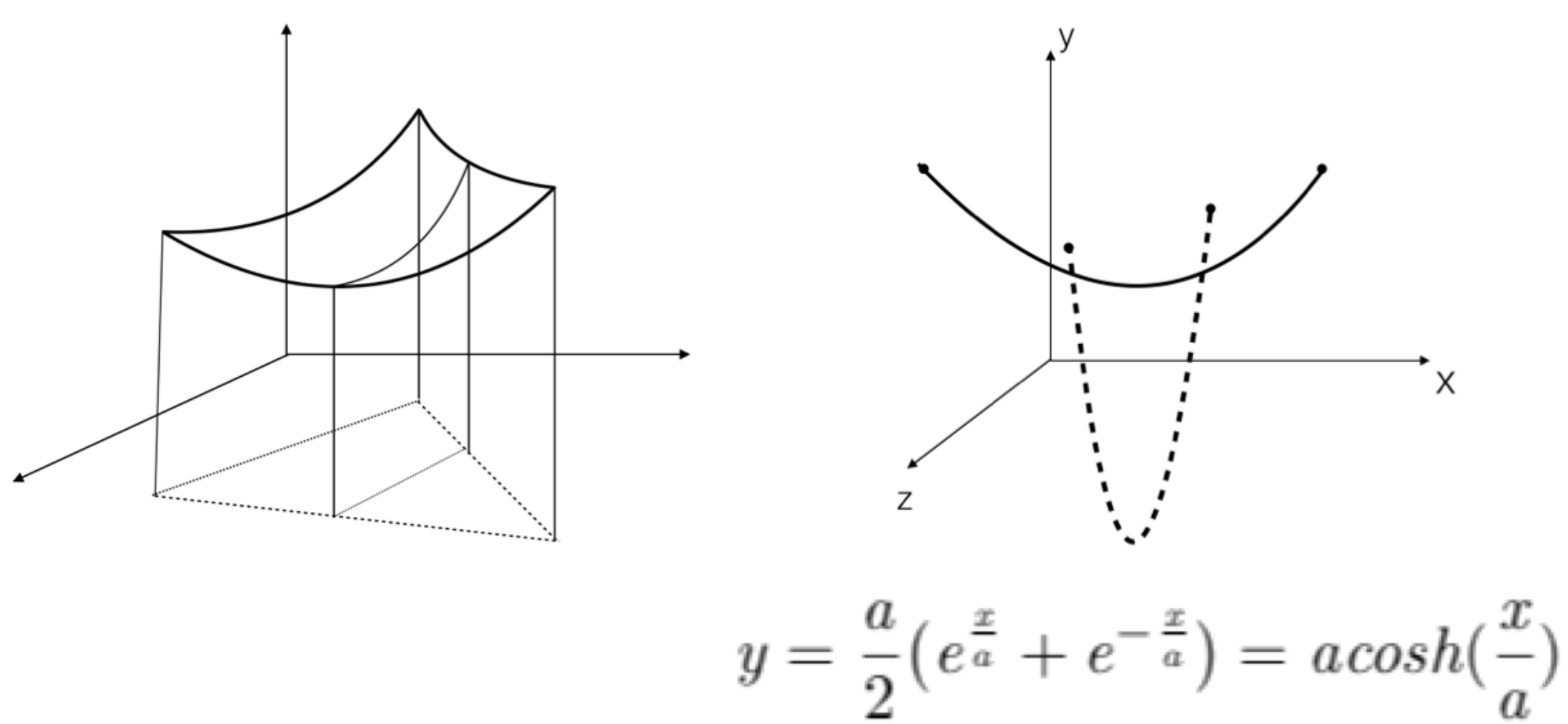


Methods for Clothsimulation

Motivation

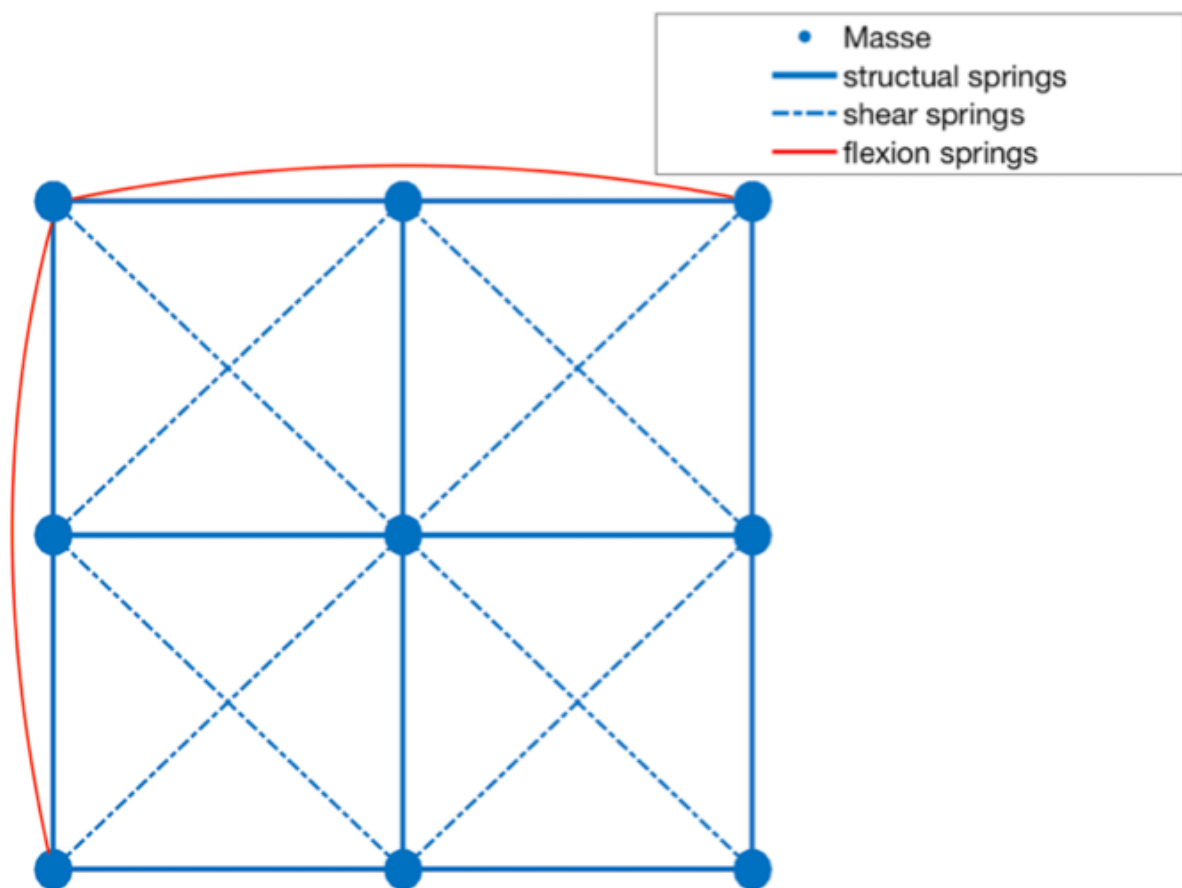
Cloth simulation is widely used in computer graphics area for computer games or animation. Our goal is to make a thorough study about the history of cloth simulation and the most important models. And thereby achieve the implement of our own model with MATLAB in dynamic way.

Geometric Model (Weil, 1986)



The curve was described with hyperbolic cosine function and the cloth model takes 2 step to finish modeling: initial form simulation and relaxation.

Mass-Spring Model



The three different springs can resist axial force, shear force and bending force.

We use Provot's Model combined with dynamics to model cloth.

For the update for positions, velocities and acceleration, the explicit integration method was used.

For the total force there is:

$$\mathbf{F}_{i,j} = m\mathbf{a}_{i,j}$$

Internal force:

$$\mathbf{F}_{int} = -k_{i,j} (|\mathbf{x}_j - \mathbf{x}_i| - l_{i,j}^0) \frac{(\mathbf{x}_j - \mathbf{x}_i)}{|\mathbf{x}_j - \mathbf{x}_i|}$$

external force:

$$\mathbf{F}_g = m\mathbf{g}$$

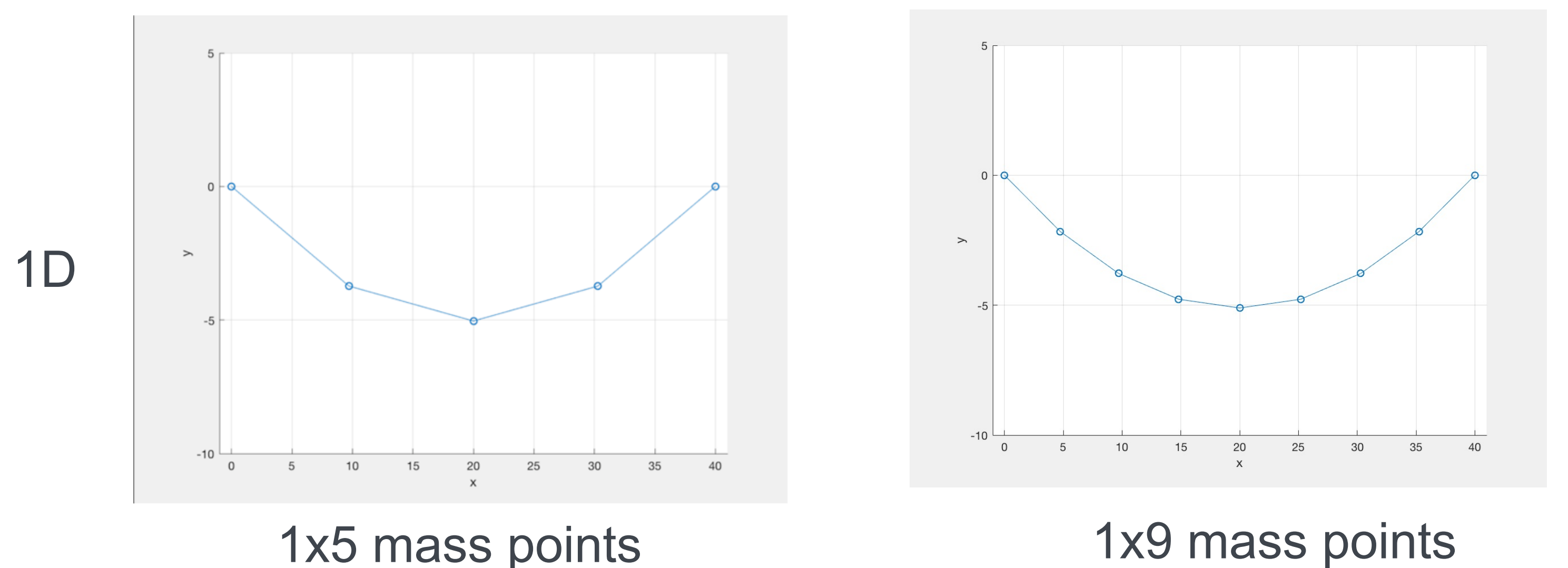
damping:

$$F_d = -C_{ij}(\mathbf{v}_i - \mathbf{v}_j)$$

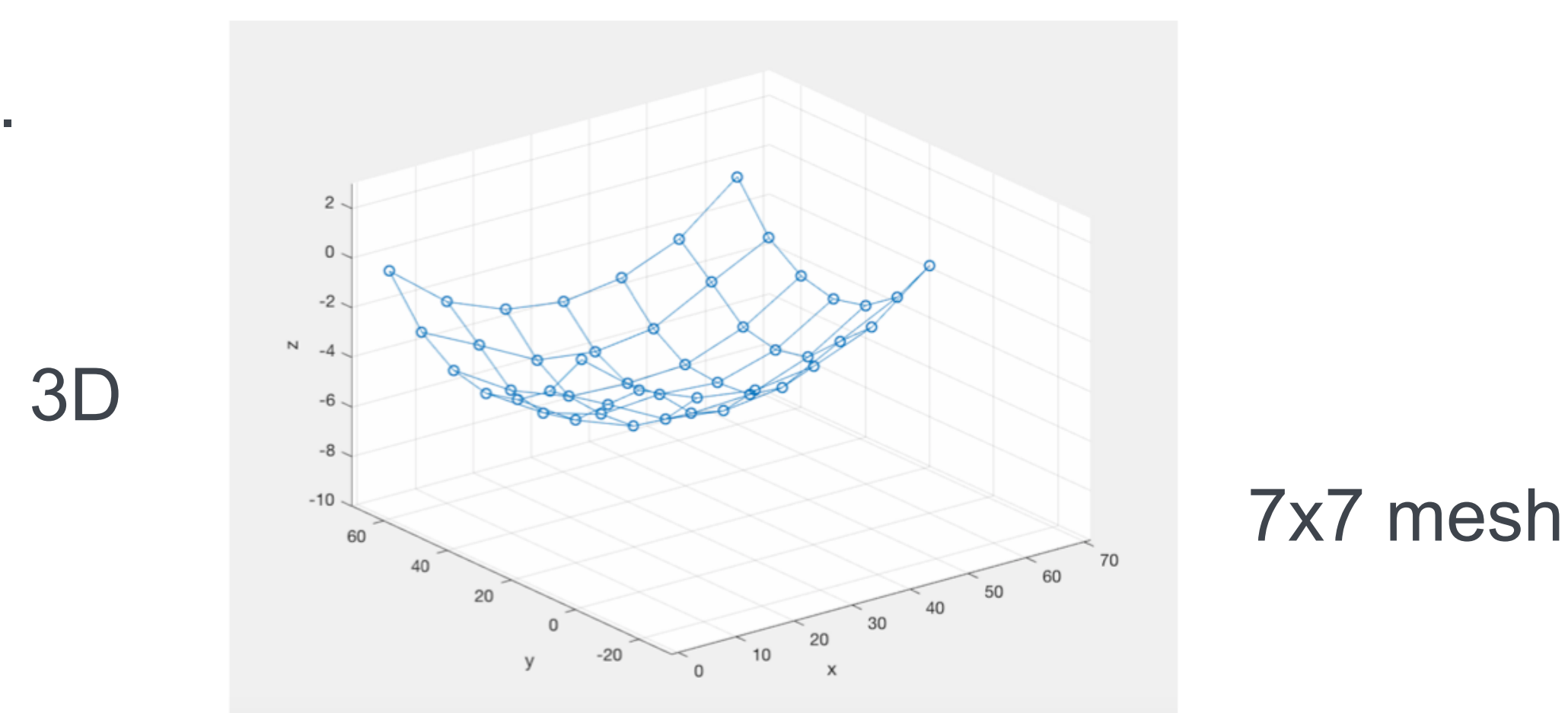
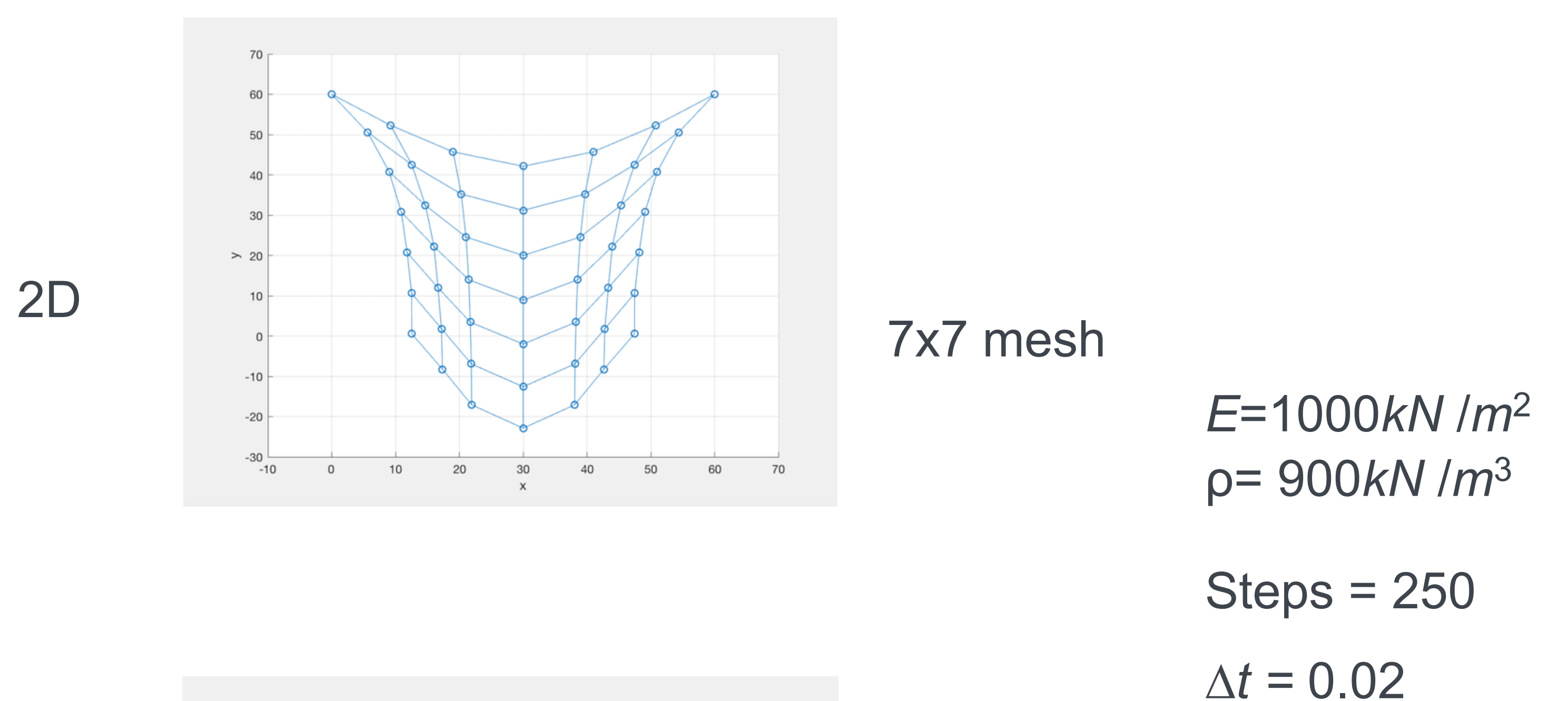
Advisors:

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Bastian Oesterle, Dr.-Ing.

Results



The two system above have the same outside conditions, and the external force will be equally divided and exert on each single point.



References

- Donald H. House, David E. Breen: Cloth Modeling and Animation. 2000
- Xavier Provot: Deformation Constraints in a Mass-Spring Model Describe Rigid Cloth Behavior