

# SIMULATION OF A TIRE USING PARTICLES

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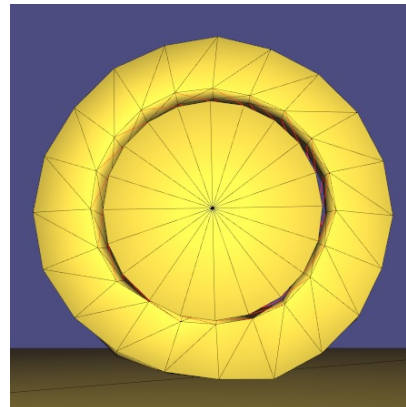
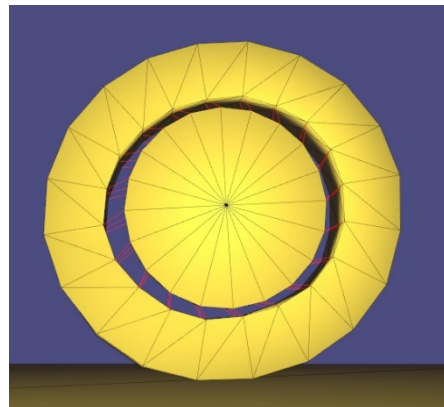
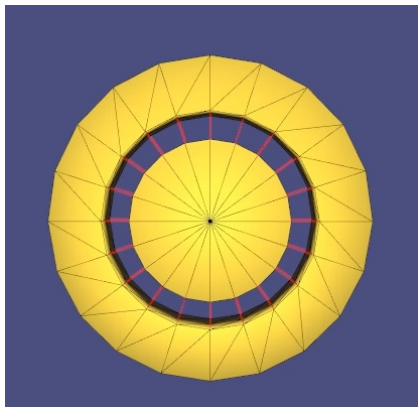
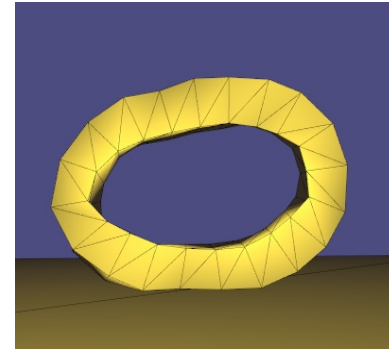
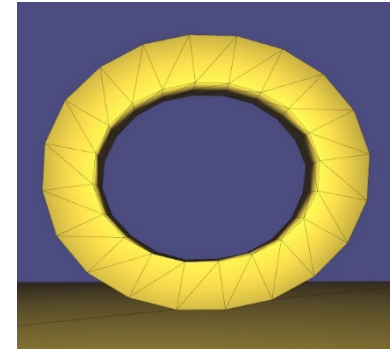
Navid Saremi

# Initial modeling

- Tire with deformation based on air pressure
  - Solid wheel base with attachments to the inside of the tire
  - Spring connecting the tire system to the body of the car
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- Removing collision between wheel-base, axel, and the tire
  - The tire is the only object that interacts with the environment

# Connections

- Intra-Tire : rigidity based on tire pressure
- Simulating pressure
- No expansion allowed only compression
- Attachments to the axel

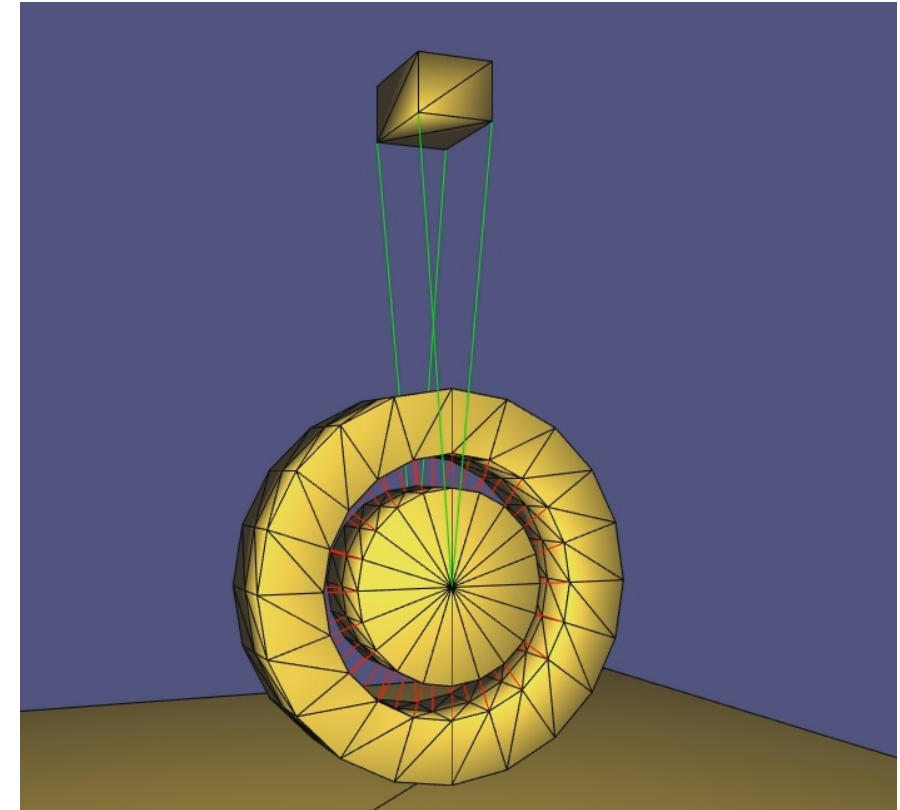
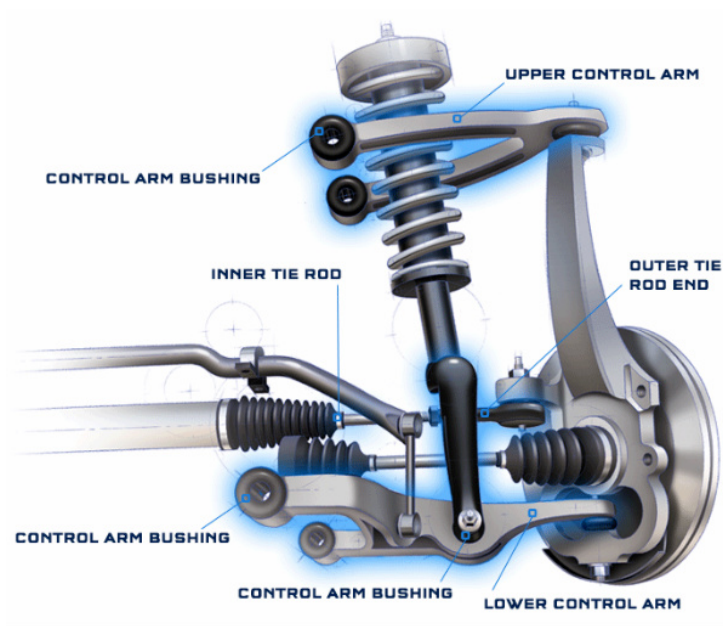


# Tire pressure

- Limiting the maximum length based on pressure
- Using air particles in the middle of tire
- Using rigidity as a pressure presentation
- Restricting expansion
- Inner circle should not compress ( attachments )

# Spring simulation

- 4 springs all with dampening (theoretically)
- 1 object to represent the mass of the car



# Spring

- Formula

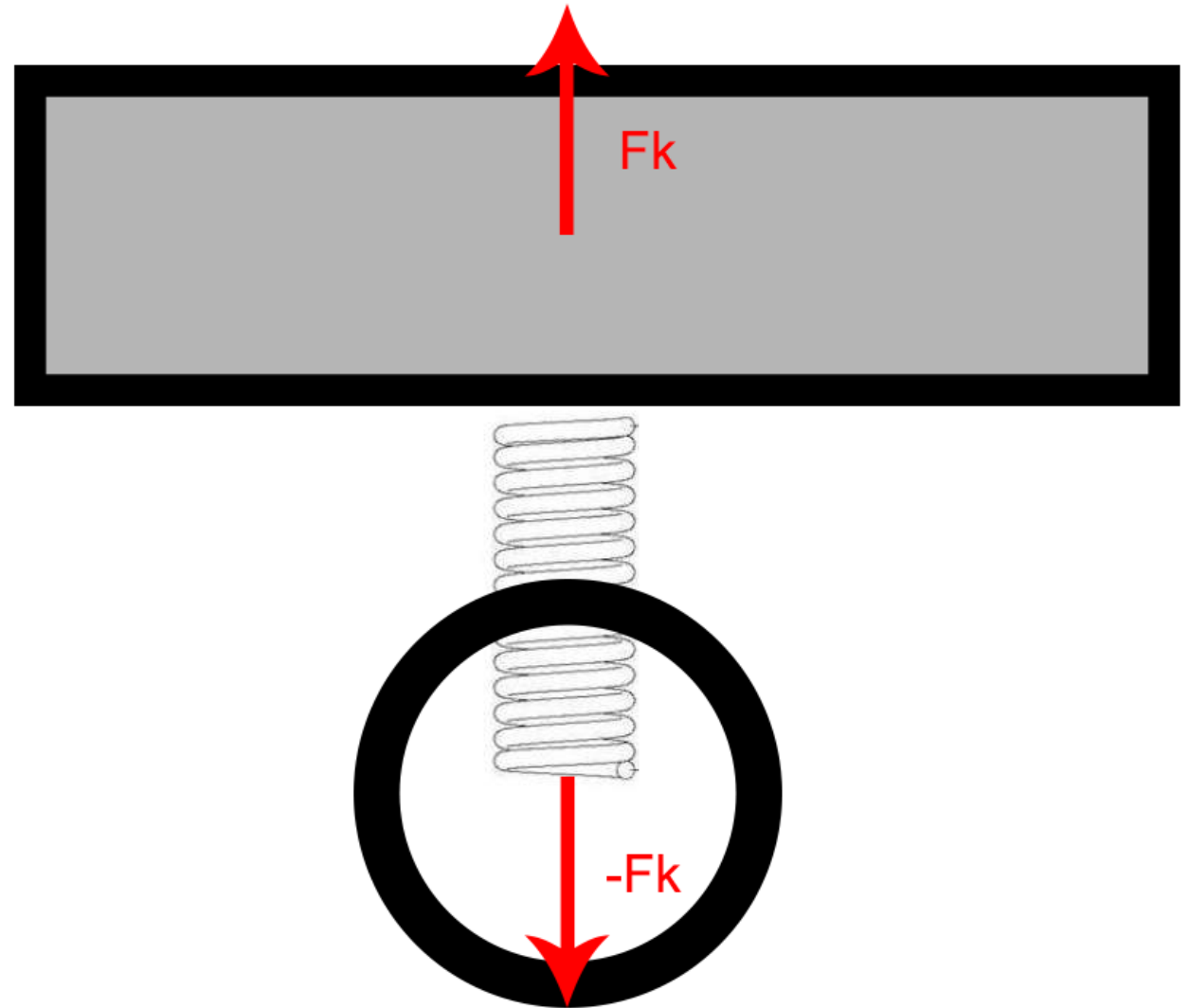
$$F_k = -K(l - l_0)$$

- Convert

$$F_k = m * a$$

$$a = \frac{F_k}{m}$$

$$v_{new} = v_{old} + a * \Delta t$$



# Spring damping

- Infinitely oscillating
- $F_{\text{damp}} = C * (V1 - V2)$
- Amplitude sinus decrease over time

# Questions?

