VP160 Recitation Class

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Equilibrium

Elasticity

Equilibrium

$$F_{ext} = 0$$
$$\tau_{ext} = 0$$

Center of Mass

$$r_c = \frac{\sum r_i m_i}{\sum m_i}$$

Elasticity

$$elasticmodulus = \frac{stress}{strain}$$

Young's modulus

$$Y = \frac{\frac{F_{\perp}}{A}}{\frac{\Delta l}{L}}$$

Bulk's modulus

$$B = -\frac{\Delta p}{\frac{\Delta v}{V}}$$

Shear modulus

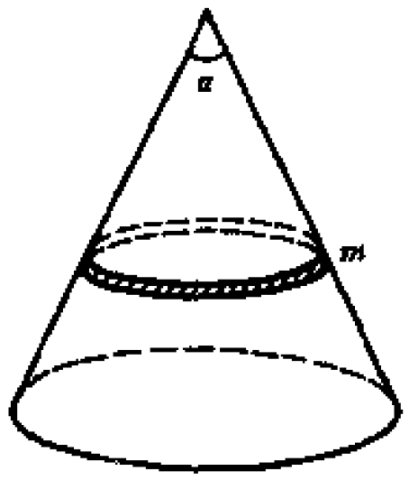
$$S = \frac{\frac{F_{\parallel}}{A}}{\frac{x}{h}}$$

Methods

1. Equilibrium equations.(Usually four)
2. Virtual work
3. Infinitesimal method
4. Derivation of energy

Question 1

Find the tension force inside the strain, as shown in the figure below. m and α are known.

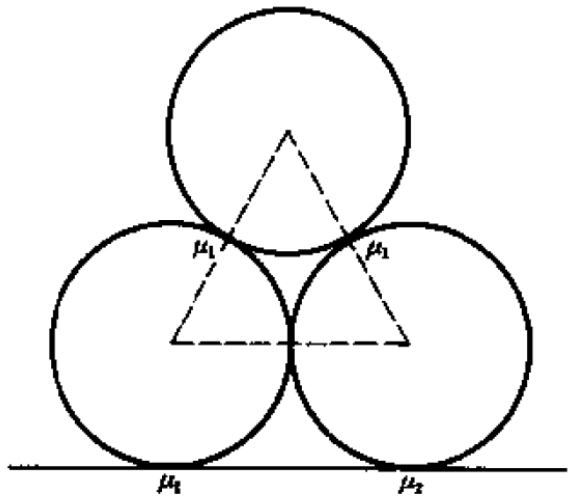


Question 2

A half cylinder is placed on the horizontal plane, and is covered by a strain with length πr and linear density λ. Find the tensile force of the strain at the top of the cylinder.

Question 3

Three cylinders have same mass and radius. Friction coefficient between two cylinders is μ_1, between cylinder and ground is μ_2. Find the minimum of μ_1 and μ_2 so that the system is in static.



Question 4

Find θ when the system is in static. Assume $l = 50$cm, $m = 50$g, $r = 8$cm, $M = 200$g.