Physics Formula Sheet

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CHAPTER 11

Mechanical Properties of Solids

Stress, strain and elastic moduli

$$Y = \frac{F/A}{\Delta L/L}, \qquad B = -\frac{\Delta P}{\Delta V/V}, \qquad \eta = \frac{F/A}{\theta}$$

ELONGATION

$$\Delta L = \frac{FL}{AY}; \qquad \text{own weight: } \Delta L = \frac{\rho g L^2}{2Y}$$

POISSON'S RATIO

$$\sigma = -\frac{\Delta d/d}{\Delta L/L}$$

THERMAL STRESS

$$\frac{F}{A} = Y\alpha\,\Delta T$$

COMPRESSIBILITY

$$k = \frac{1}{B}$$

Elastic potential energy

$$\frac{U}{V} = \tfrac{1}{2}\times\text{stress}\times\text{strain}, \qquad U = \tfrac{1}{2}F\,\Delta L$$

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