

Laws/Definitions/Equations

Hooke's Law force and extension are directly proportional under constant physical conditions

$F = kx$ (where k is spring constant and x is extension)

elastic potential $\frac{1}{2} Fx = \frac{1}{2} kx^2$

for a force-extension graph:

area under graph > energy

gradient > spring constant

springs

for two springs in	k	extension
series	halved	extends more
parallel	doubled	extends less

Young modulus

every material has its own young modulus.

$Y_m = \text{stress} / \text{strain}$

$\Delta L \propto 1/A \propto 1/d^2$

an object that has reached limit of proportionality will still return to its original state. only the force/extension will not be proportional

an object that has reached the limit of elasticity will not return to its original shape

ductile: large plastic region

brittle: high energy, no plastic region

ultimate tensile stress: maximum stress it can withstand before breaking

= maximum load / original area

Force/stress - extension/strain graphs:

($f-x$ and $s-s$ graphs)

-the gradient is the energy (more g more e)

- the loading curve for example, is a straight line up to the limit of proportionality.

- after this point the unloading curve is underneath this

- the enclosed area created is the energy lost as heat during the processes



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