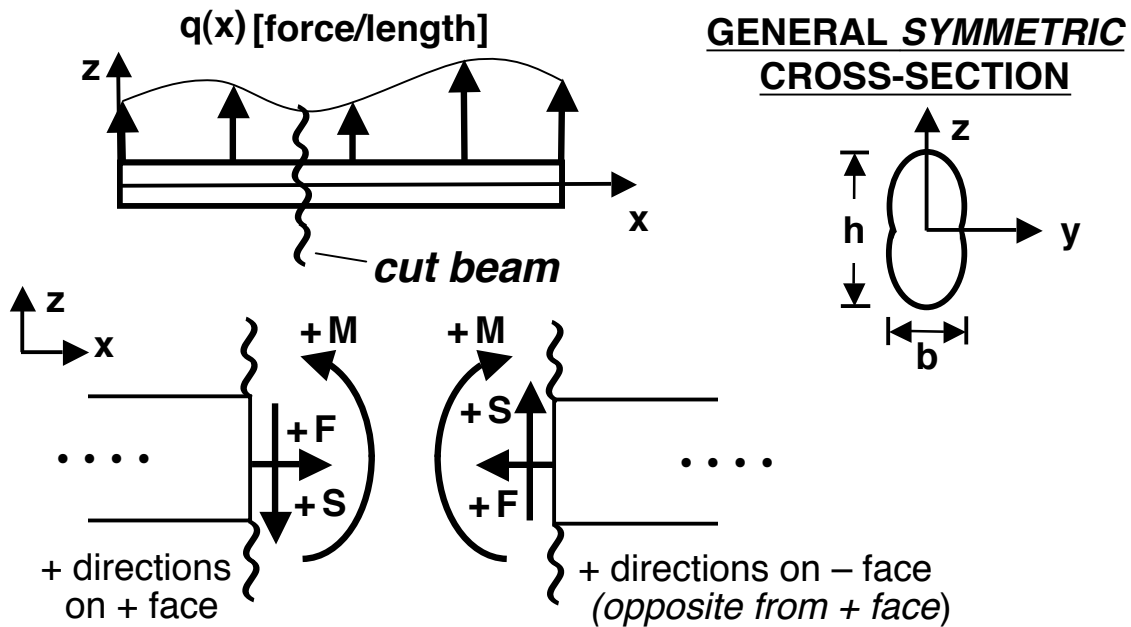


Unified HANDOUT #M-8

Spring, 2007

Summary of Simple Beam Theory



PERTINENT EQUATIONS

b = width
 h = height

$q(x)$ = loading
 $F(x)$ = axial load resultant (= 0 for pure beam case)
 $S(x)$ = shear resultant
 $M(x)$ = moment resultant

$$\frac{dS}{dx} = q(x) \quad \text{or} \quad S = \int q(x) dx \quad (1)$$

$$\frac{dM}{dx} = S(x) \quad \text{or} \quad M = \int S(x) dx \quad (2)$$

$$\sigma_{xx} = - \frac{Mz}{I} \quad (3)$$

$$\text{Moment of Inertia} = I = \int z^2 b(z) dz$$

$$\sigma_{xz} = - \frac{SQ}{Ib} \quad (4)$$

$$\text{Moment of Area} = Q(z) = \int_{z_{op}}^z z b(z) dz$$

$$M = E_x I \frac{d^2 w}{dx^2} \quad (5)$$