Georgia Institute of Technology

Applications in Engineering Mechanics

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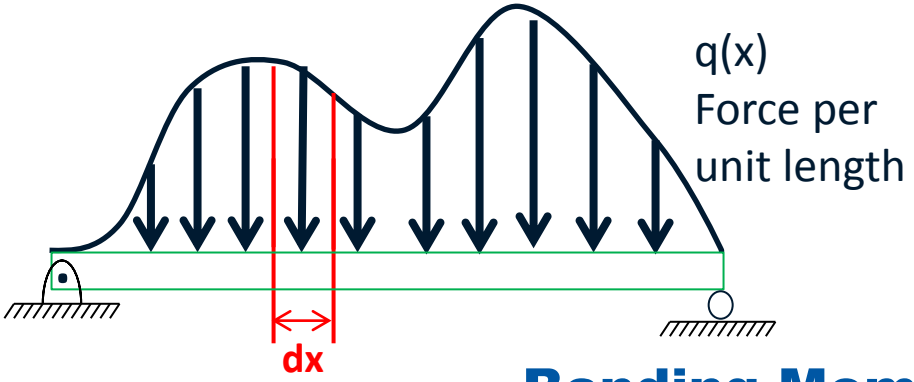
This course addresses the modeling and analysis of static equilibrium problems with an emphasis on real world engineering systems and problem solving.

Module 16 Learning Outcomes

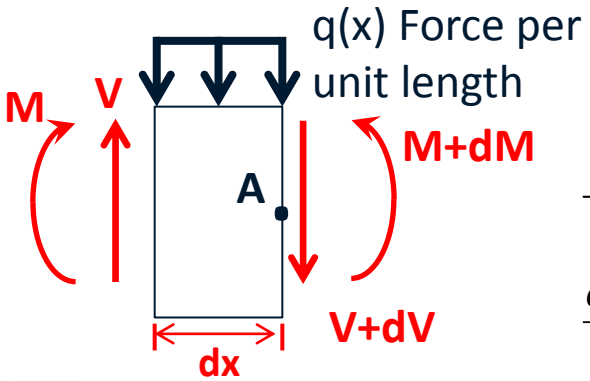
- Determine internal Shear Forces and Bending Moments in multiforce members.
- Sketch a Bending Moment Diagram for a multiforce member

Differential Beam Element



The value of the Shear Force equals the slope of the Bending Moment Diagram at a point.

Bending Moment



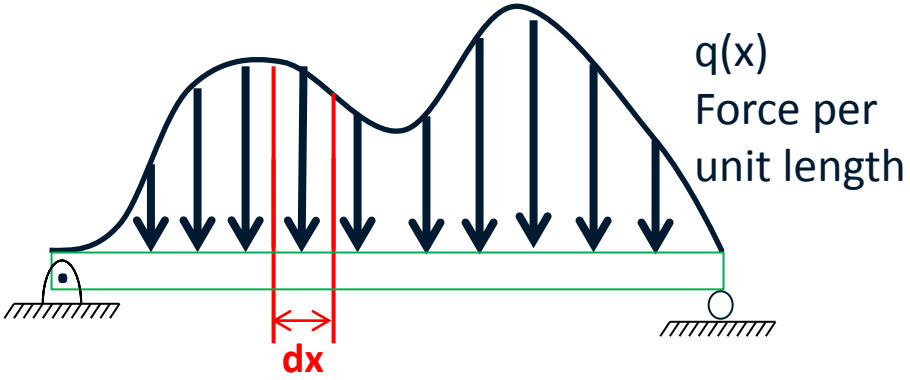
$$\sum M_A = 0$$

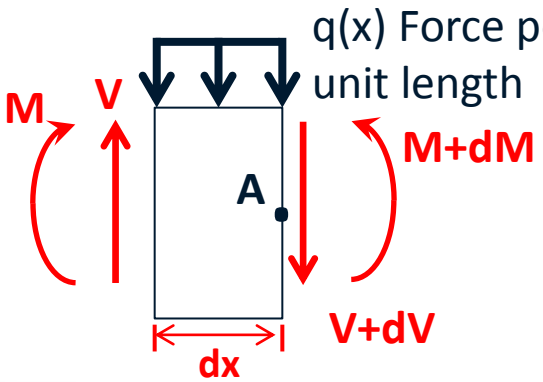
Neglect higher order term

$$-M - V\,dx + q(dx)\left(\frac{dx}{2}\right) + M + dM = 0$$

$$\frac{dM}{dx} = V$$

Differential Beam Element



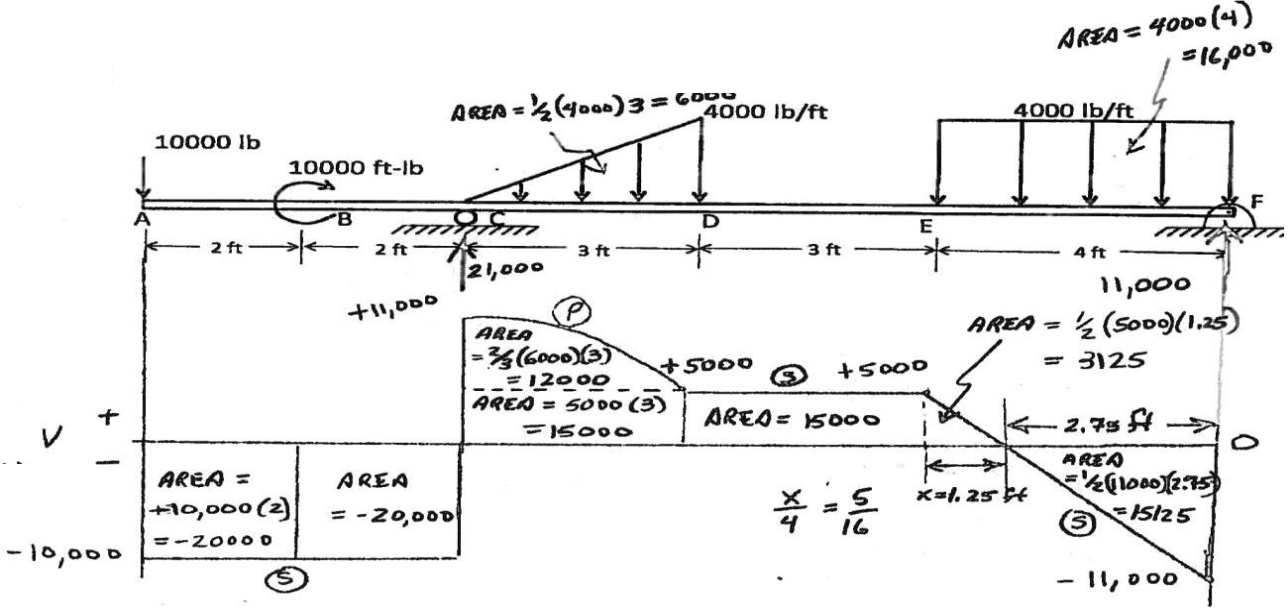


$$\frac{dM}{dx} = V$$

$$\int_{M_1}^{M_2} dM = \int_{x_1}^{x_2} V \; dx$$

$$\Delta M = \int_{x_1}^{x_2} V \; dx$$

The change of bending moment between two points equals the area under the shear force curve.



$$\frac{dM}{dx} = V \qquad \Delta M = \int_{x_1}^{x_2} V \, dx$$

Bending Moment