

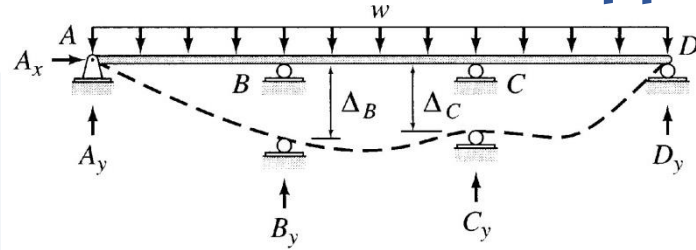
Structural Mechanics (1)

Week No-08

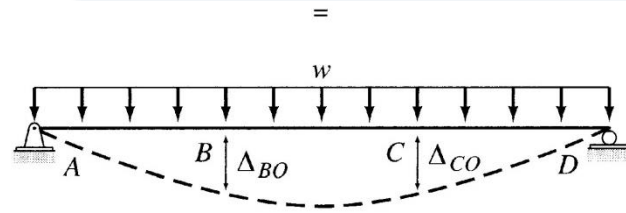
Analysis of Indeterminate Structures - Force Method

- Indeterminate Structures vs. Determinate Structures
- Analysis of Indeterminate Structures.
- Structures with single Degree of Indeterminacy (Beams & Frames)
- Structures with single Degree of Indeterminacy (Trusses: Int. & Ext.)
- Structures with multiple Degrees of Indeterminacy
- **Support Settlements**
- **Three-Moment Equation for Continuous Beams**

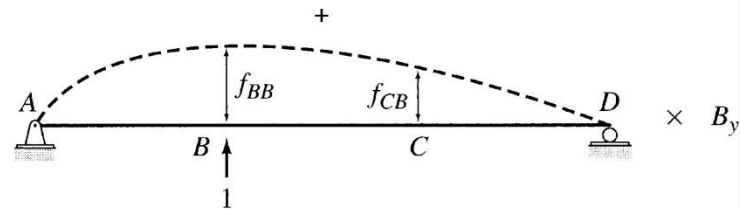
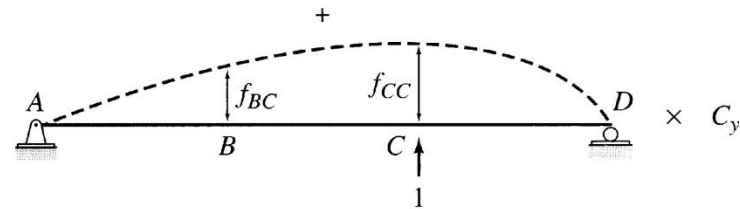
Support Settlements



(a) Indeterminate Beam



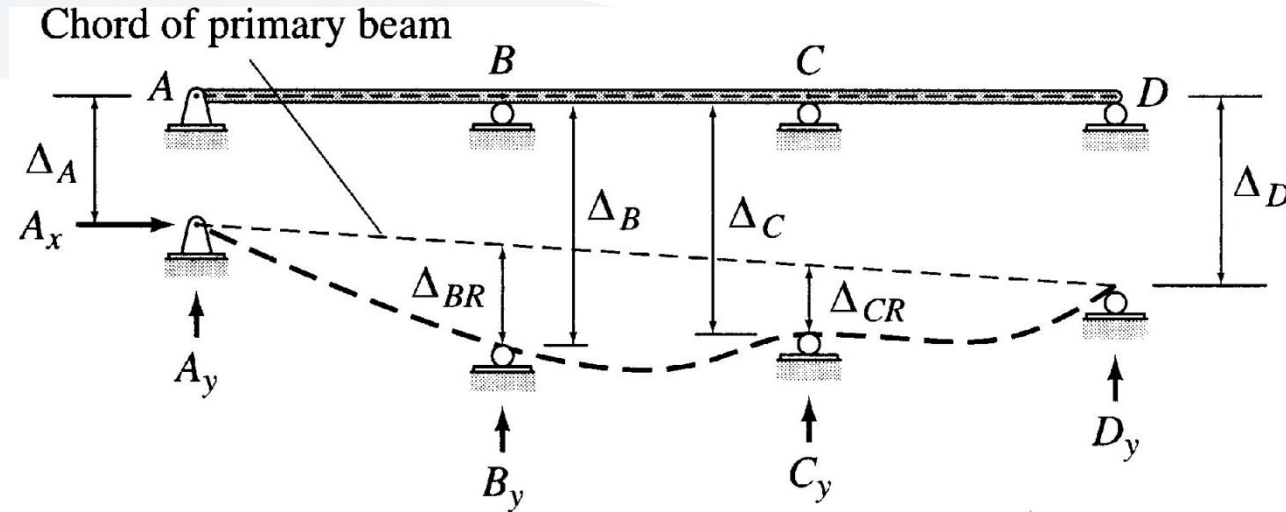
(b) Primary Beam Subjected to External Loading

(c) Primary Beam Loaded with Redundant B_y (d) Primary Beam Loaded with Redundant C_y

$$\Delta_{BO} + f_{BB}B_y + f_{BC}C_y = \Delta_B$$

$$\Delta_{CO} + f_{CB}C_y + f_{CC}C_y = \Delta_C$$

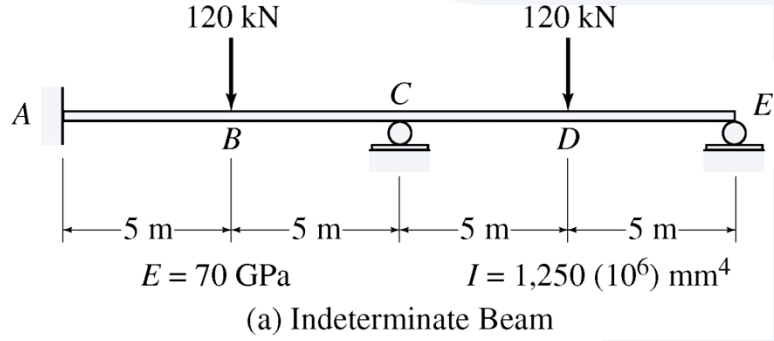
Relative Support Settlements



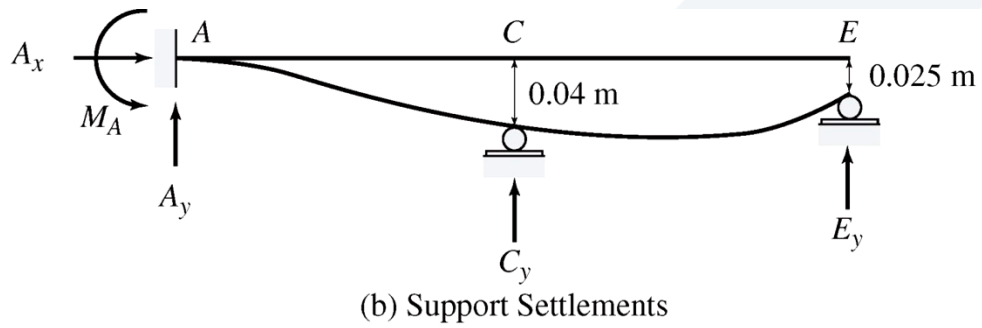
Compatibility equations:

$$f_{BB} B_y + f_{BC} C_y = \Delta_{BR}$$

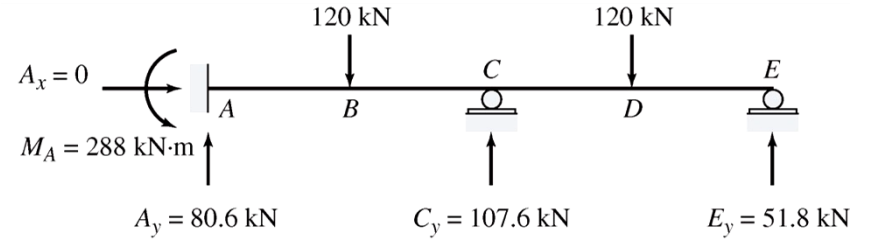
$$f_{CB} B_y + f_{CC} C_y = \Delta_{CR}$$



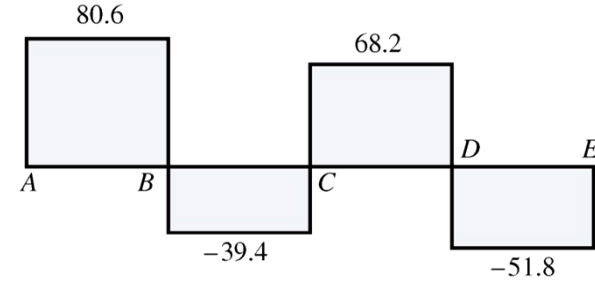
(a) Indeterminate Beam



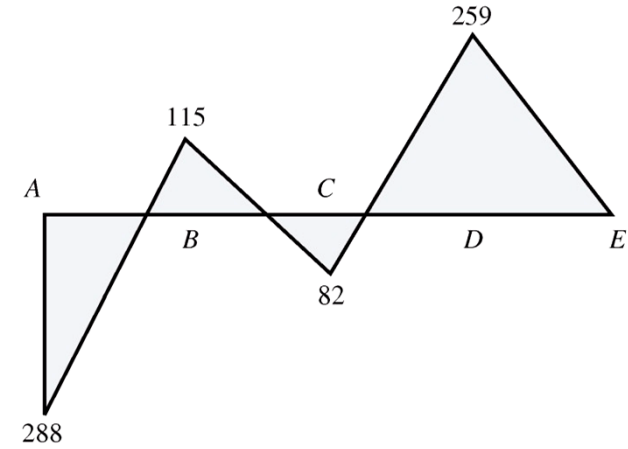
(b) Support Settlements



Reactions



Shear diagram (kN)



Bending moment diagram (kN-m)