

DIRECT ANALYSIS METHOD [AISC CH. C]

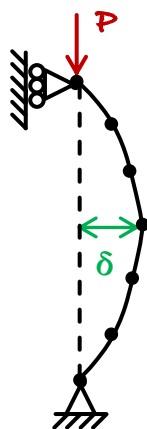
(a) Flexural, shear, axial, and all other deformations contributing to displacement of structure

→ easily handled by most commercial software

(b) Second-Order Effects (P- δ , P- Δ)

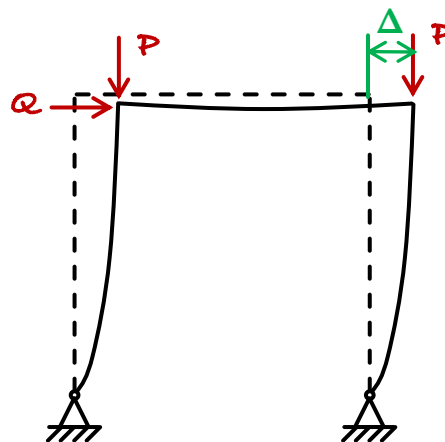
→ perform equilibrium on the deformed structure
i.e. use a 2nd order analysis in software

P- δ



By subdividing column and using load steps, additional moments and deflections in column member are captured

P- Δ

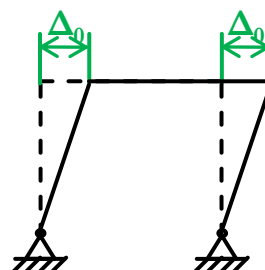


Additional moments and deflections caused by P- Δ are included using loads applied in steps

(c) Geometric Imperfections

System: AISC Code of Standard Practice

$$\Delta_0 = \frac{L}{500}$$



→ build columns crooked or use notional loads [AISC Ch. C2.2]

Member: → use AISC Column Curve in Ch. E to design members

(d) Stiffness Reduction due to Inelasticity

→ use 0.8E in analysis to reduce all stiffnesses

[AISC Ch. C2.3(a)]

→ include τ_b by using

AISC Ch. C2.3(b)
Equation

OR

AISC Ch. C2.3(c)
notional loads

OR

inelastic σ - ϵ
in analysis

(e) Uncertainty in stiffness and strength

→ use LRFD



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