

Seoul Nat'l University

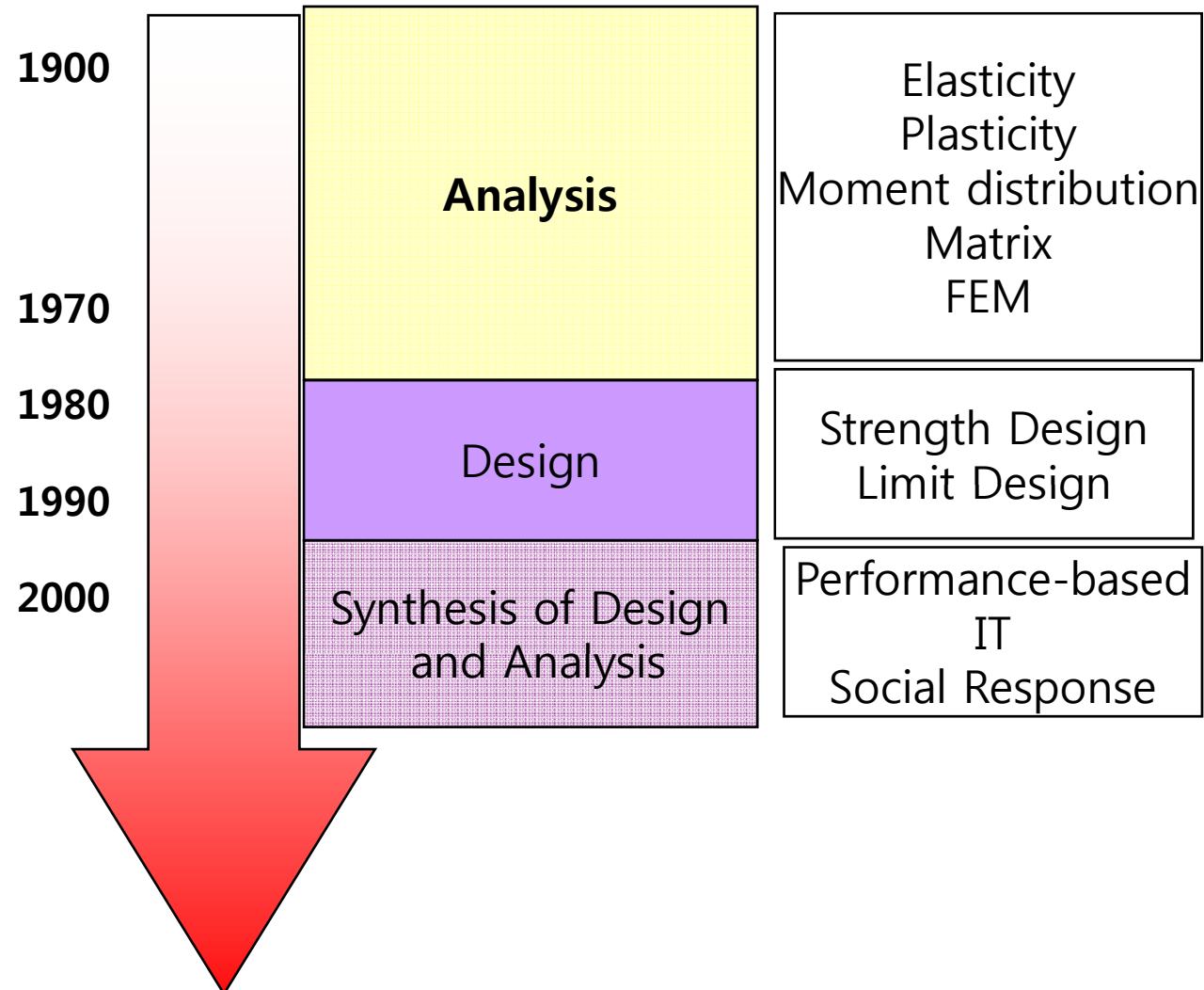
Concrete in Plasticity

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SNU

March 2, 2006

From analysis to Design and Synthesis

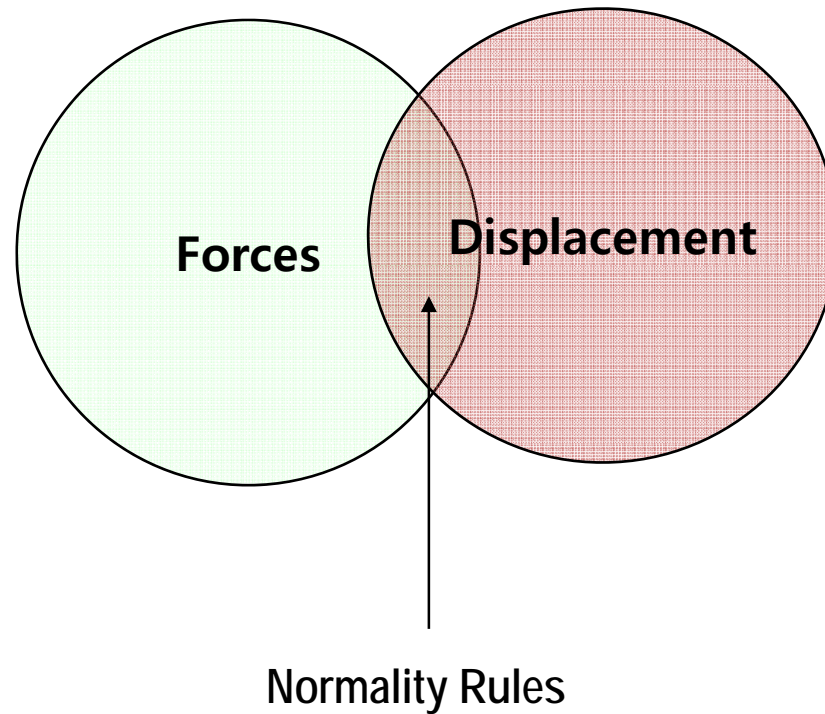


History of Theory of Plasticity

- **Gvosdev**
- **Drucker and Prager**
- **W.F Chen**
- **Johansen: Yield Line Theory**
- **Hillerborg: Strip Method**
- **The Technical University of Denmark:**
- **Nielsen and Braestrup**
- **Swiss Federal Institute of Technology in Zurich:**
- **Mueller and Marti**
- **Vecchio and Collinse in Canada**
- **T.T.C.Hsu in U.S.A**

Limit Theory for Design of Reinforced Concrete

- Lower Bound
 - Equilibrium
 - Yield Condition
- Upper Bound
 - Geometry
 - Work equation



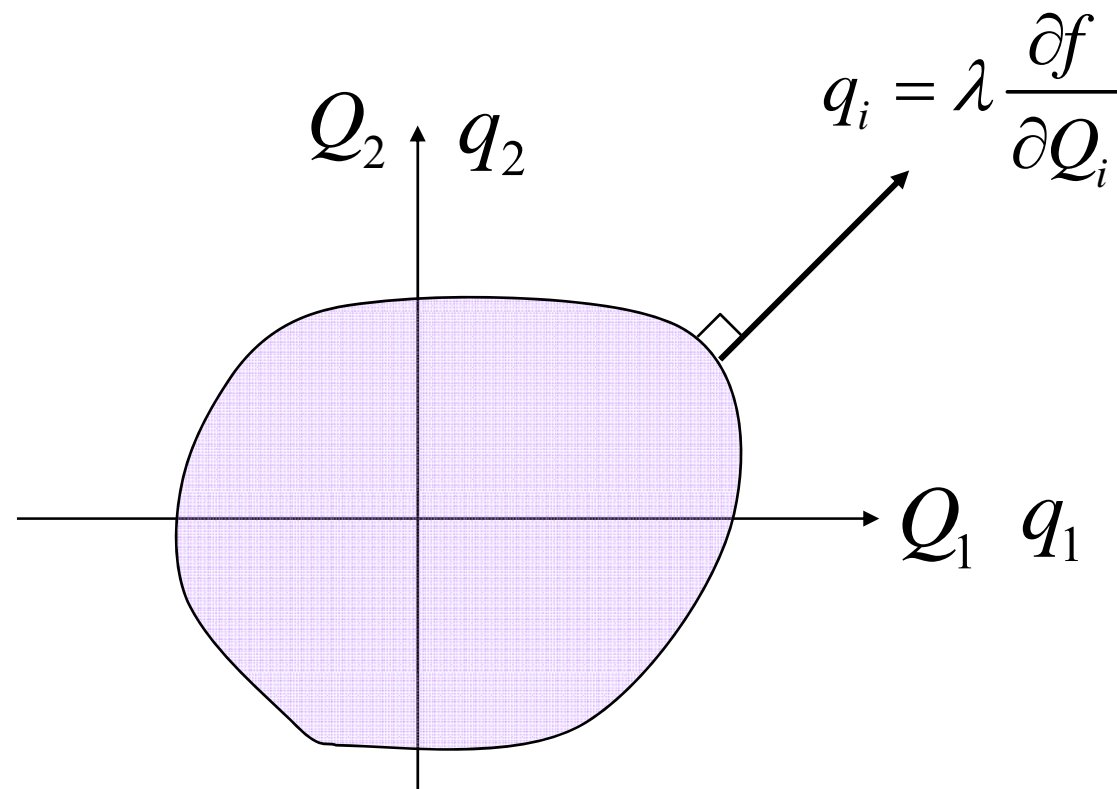
Contents

- Theory of Plasticity
- Yield Conditions
- Theory of Plain Concrete
- Disks
- Beams
- Slabs
- Punching Shear
- Bond Strength

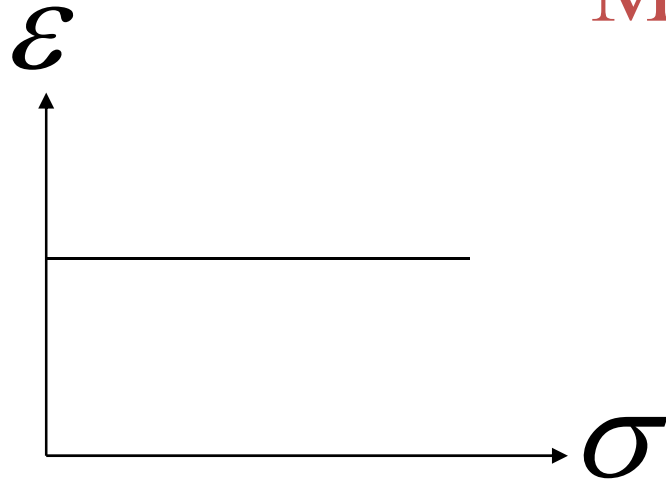
Theory of Plasticity

- **1.1 Constitutive Equations**

Von Mises's Flow Rule



Extreme Principles for Rigid-Plastic Materials

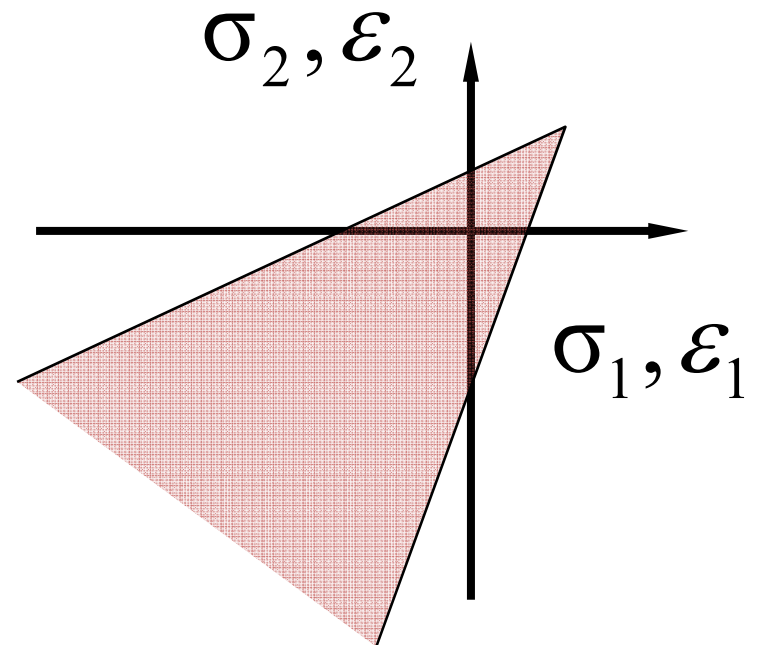
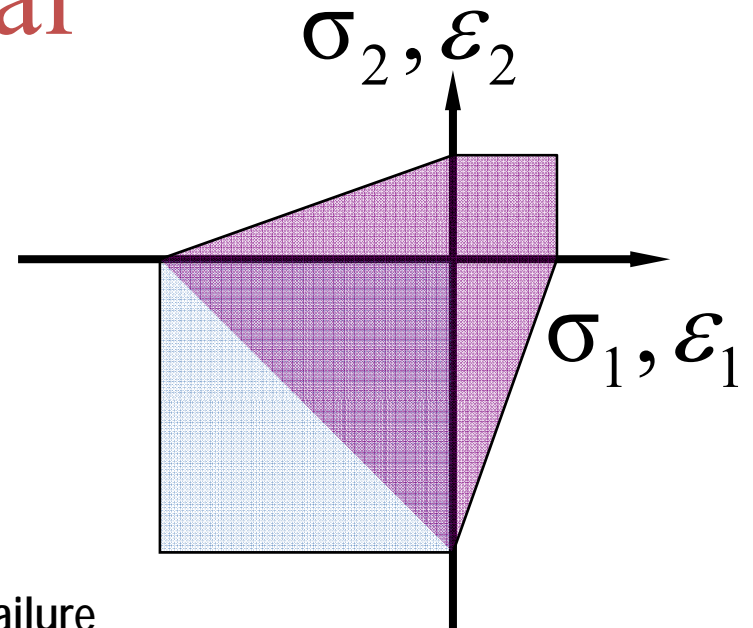
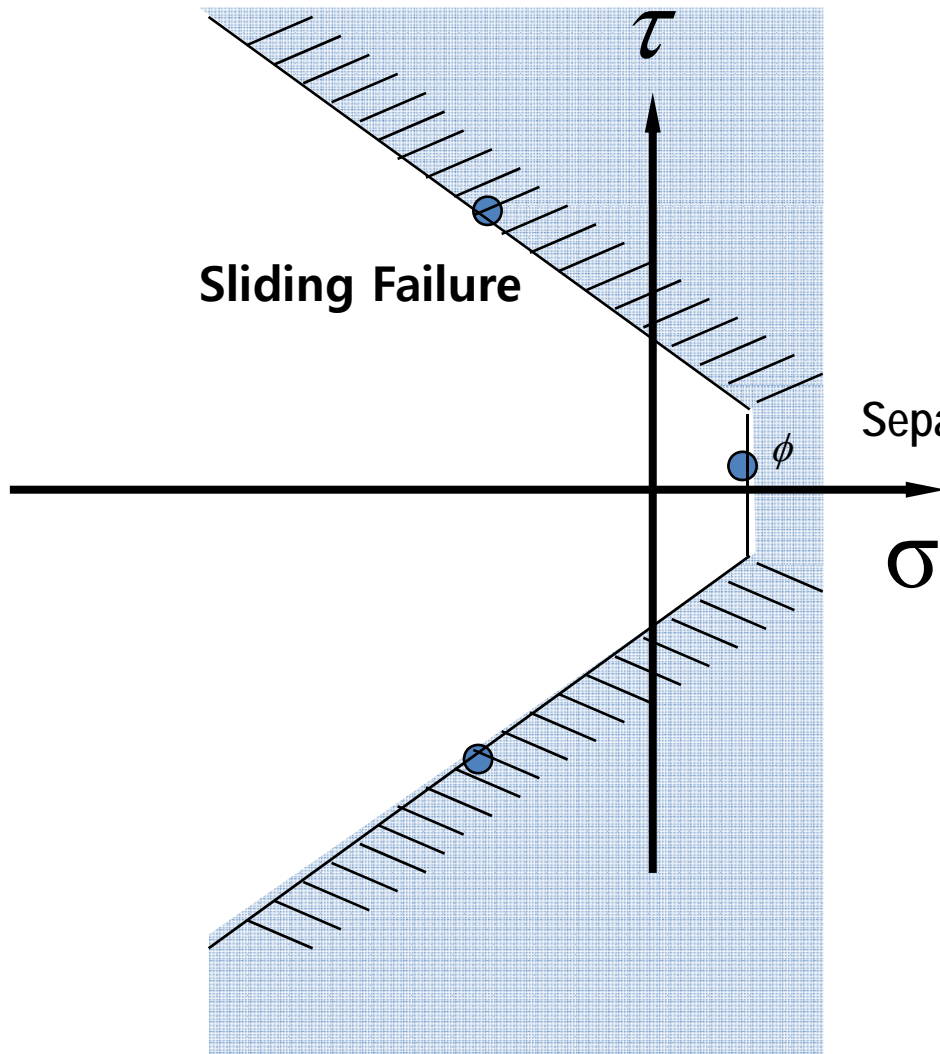


- Lower Bound Theorem
- Upper Bound Theorem
- Uniqueness Theorem

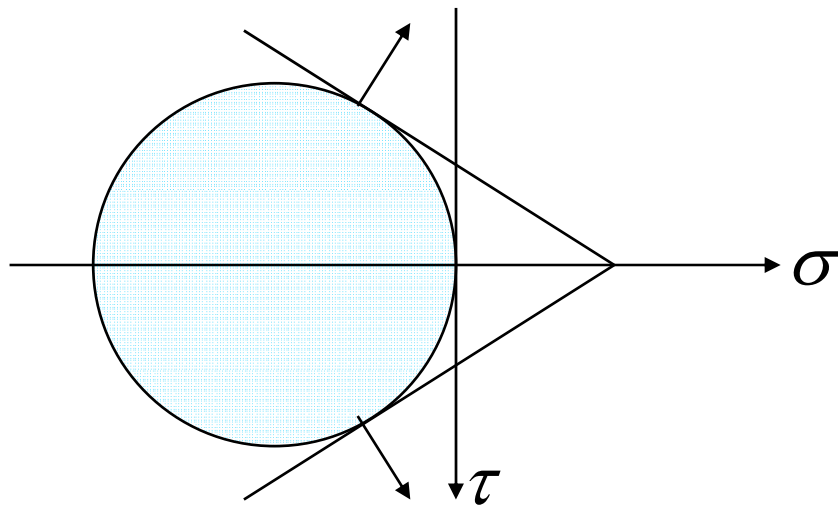
Yield Conditions

- Concrete
 - Frictional hypothesis
- Reinforcing bar
- Disks
- Slabs

Mohr Coulomb Material

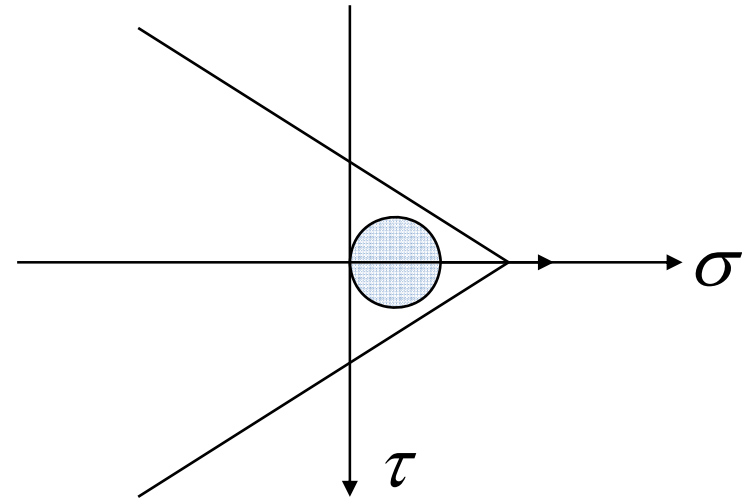


Determination of Parameters for More-Coulomb material

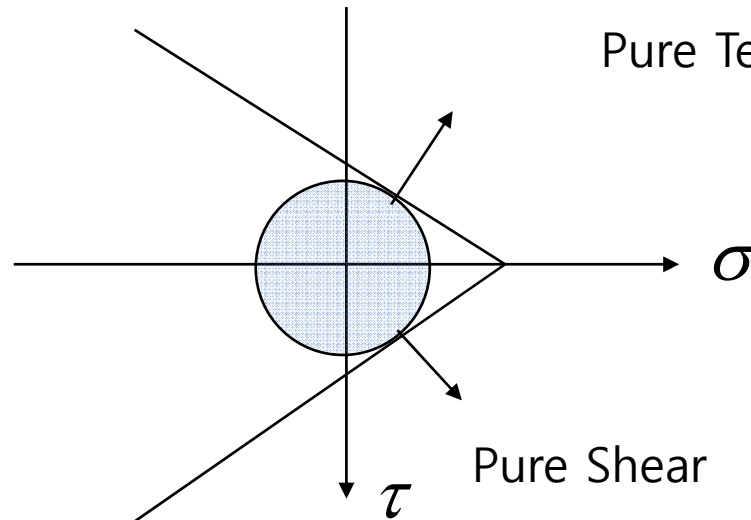


Pure Compression

$$k\sigma_1 - \sigma_3 = f_c$$

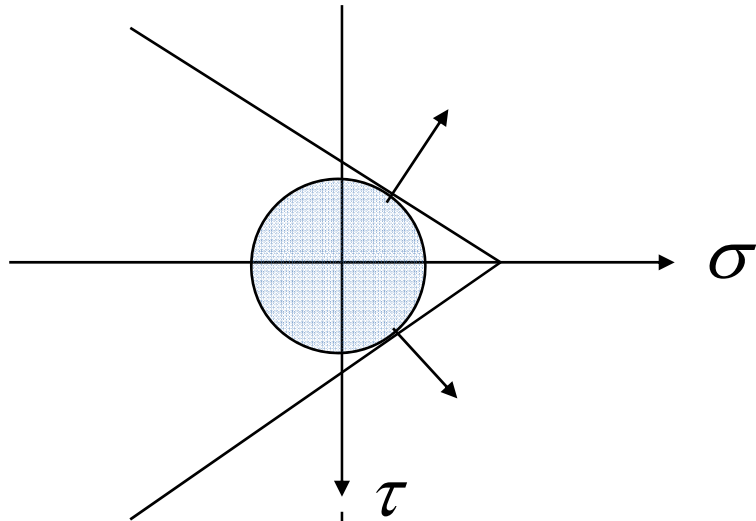


Pure Tension

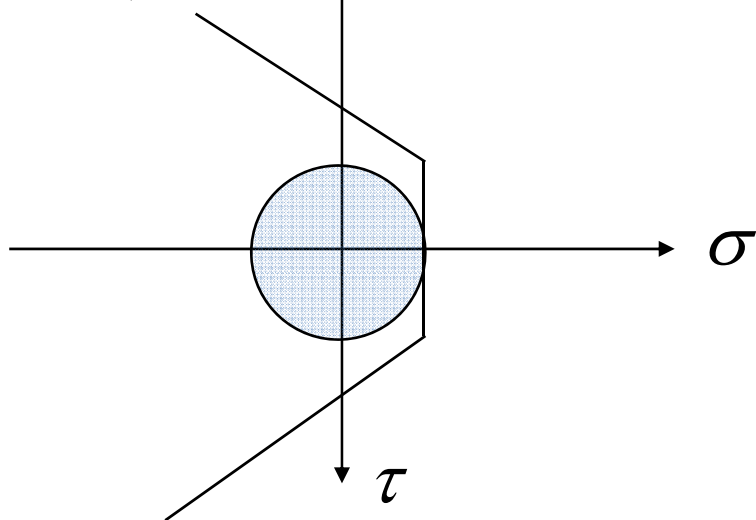


Pure Shear

Failure Modes in Pure Shear



Sliding failure



Separation failure