

Course Name:
Theory of plasticity

Course Number:
20142

Credit:
3

Course Content (outline)

1. Introduction and One-Dimensional Analysis

2. General Principles

Stress and Strain Tensors, Equilibrium Equations

3. Yield and Failure Criteria

Tresca Criterion, von Mises Criterion, Rankine Criterion, Mohr- Coulomb Criterion, Drucker- Prager Criterion, Other Criteria

4. Perfectly Plastic Stress Analysis

Loading Criterion, Plastic Potential and Flow Rule, Constitutive Relation.

5. Hardening Plastic Stress Analysis

Deformational Theory, Loading Surfaces and Criteria, Flow Rules, Hardening Rules, Effective Stress and Effective Plastic Strain, Incremental Stress-Strain Relationships, Multisurface Models, Endochronic Theory, Numerical Methods

6. Selected Topics

Rate Dependent Plasticity, Damage plasticity, Strain Space Formulations, Finite Deformation Plasticity, Dislocation Theory of Metals and Plastic Deformation of Crystals, Models for Concrete, Ceramics, and Composites

References:

- W.F. Chen and H. Zhang, Structural Plasticity, Springer-Verlag, 1991.
- A. Khan and S. Huang, Continuum Theory of Plasticity, J. Wiley & Sons, 1995.
- M. Jirasek and Z.P. Bazant, Inelastic Analysis of Structures, J. Wiley & Sons, 2002.