

CE 234 Computational Inelasticity

Instructor:

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Office hours: To be announced.

Location and time: MWF 9-10, 4 Evans.

Textbook: J.C. Simo & T.J.R. Hughes, "Computational Inelasticity", Springer Verlag, 1998.

Grading system:

Grades will be based on homework assignments and the final exam. The final exam is planned to be take-home. No late homework will be accepted.

Topics to be covered:

1. One dimensional plasticity and viscoplasticity.
2. Integration algorithms for 1-D plasticity and viscoplasticity; the elastoplastic BVP.
3. Multi-dimensional plasticity, thermodynamics and dissipation.
4. Integration algorithms for plasticity and viscoplasticity; general return mapping algorithms (operator splits, closest-point projection,...).
5. Weak formulations and finite element implementation; consistent linearization.
6. Nonlinear stability of integration algorithms for plasticity and viscoplasticity.
7. Review of nonlinear continuum mechanics; finite elasticity.
8. Hypoelastic plasticity models; objective integration algorithms.
9. Multiplicative finite strain plasticity.
10. Integration algorithms for multiplicative plasticity.
11. Extensions (time permitting): thermo-plasticity, poro-plasticity, visco-elasticity, damage,...