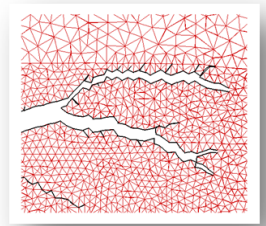
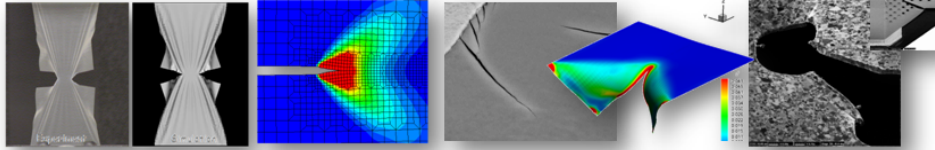
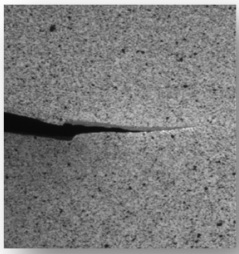


Nonlinear Fracture Mechanics

Fall 2024



CE 597: Nonlinear Fracture Mechanics (Brightspace: <https://purdue.brightspace.com/d2l/home/1092547>)

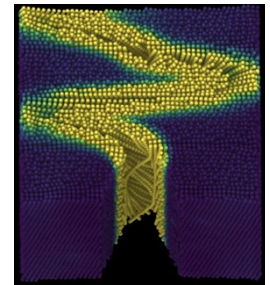
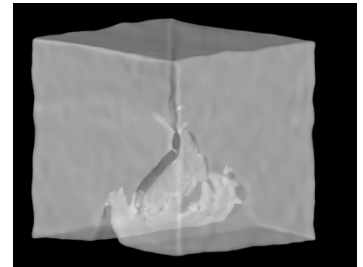
HAMP 1113, Tuesdays and Thursdays 1:30 pm-2:45 pm

Instructor: Prof. Pablo Zavattieri, Office: HAMP G217, 496-9644, E-mail: zavattie@purdue.edu

Description: This is a graduate course in Fracture Mechanics for those students who are interested in learning more about the concepts of material inelastic deformation and failure in the context of solid mechanics when cracks are present. The class will be introductory in nature, as we will start with the fundamental concepts of elastic fracture mechanics before we look at nonlinear and complex behavior. The final part of the course will be based on projects where the student will be able to solve some open-ended problems using computational, analytical or experimental tools.

Course Main Topics:

- Overview: Elasticity, Atomic-scale concepts
- Linear elastic fracture mechanics, stress intensity factor, fracture toughness, energy release rate, work of fracture, J-integral
- Small-scale yielding/plastic fracture mechanics, resistance curves
- Fracture in engineering materials (e.g., ceramics, polymers, metals, composites, 3D printed, biological materials)
- Cohesive zone models
- Size effects. Multiscale fracture
- Strain rate and instabilities
- Testing methods, Numerical methods. Combined experimental/computational approaches



Homework: Every few lectures. **Projects:** Depending on the number of students and their interests, there will be theoretical, computational, and experimental projects.

Web site: Homework, projects, exams, handouts, and grades will be posted on the course Brightspace: <https://purdue.brightspace.com/d2l/home/1092547>

