

Mechanics of Architected Materials

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Motivation

Traditionally, geometry and material parameters are viewed as independent choices that an engineer makes in design. Recall the geometric shape factor in elastoplastic design that you learned about in MECH 360. This traditional paradigm is no longer tenable thanks to our ability to print materials with geometry on demand. In other courses you might have learned about the significance of material micro structure (at the material grain and crystalline level) on its macroscopic mechanical properties.

Objectives

The aim of this project is to explore the interplay between material properties and geometry. Specifically correlate the strength, toughness, fatigue life, and damping to material topology through design and testing.

Tools

Finite element computations. Solid works/Unigraphics CAD design and 3D printing. Testing for tensile and vibroacoustic properties. The facilities are available in MECH department.

Candidate Background

Those who have interest and curiosity about how materials and structure work. CAD, machining skills are essential. Exposure to finite element computational tools is desirable. Exposure to fracture mechanics is desirable. Above all else, the ability to learn on the go is essential.