MAE *Seminar* SERIES

DISTINGUISHED SPEAKER

MONDAY,
JULY 22
11:00 AM
340C BELL HALL

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ADAPTIVE CONTROL OF MECHANICAL WAVE PROPAGATION THROUGH TUNABLE ARCHITECTED MATERIALS

ABSTRACT

Control of mechanical waves is desirable for applications in vibration damping, hearing protection, non-destructive evaluation, thermal management, and noise control. However, most material solutions for these applications are passive and restricted to specifically engineered frequencies. Solutions such as metamaterials can manipulate wavelengths much larger than the feature sizes of the metamaterial, but their operational bandwidth can be limited. The goal of this work is to dynamically tune the bandgaps associated with acoustic metamaterials by incorporating functional materials like magnetoelastomers or shunted piezocomposites. Metamaterials will be fabricated from active materials that can vary their elastic properties through an external stimulus via an electric or magnetic field. Experimental work will establish the relative impact of an external stimulus on the elastic properties of different composite material systems, and computational work will elucidate the optimal integration of functional/responsive elements within the metamaterial designs.

BIO SKETCH

Dr. Abigail Juhl is a materials research engineer in the Materials and Manufacturing Directorate at Air Force Research Laboratory (AFRL). Juhl is leading an effort to dynamically control the propagation of acoustic waves through architected materials for application in hearing protection. She is an expert in patterning nano- and micro-scale materials over macroscale volumes. Juhl received her bachelors of science in materials science and engineering from North Carolina State University and her doctorate in materials science and engineering from the University of Illinois Urbana-Champaign. She completed a National Research Council Postdoctoral Fellowship in the Optical Materials Branch at AFRL before starting in her current position.

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