"Design and analysis of piezoelectric transducers for ultrasonic inspection of plate-like structures"

Embedded damage detection systems have the potential to create a paradigm shift in structural engineering by enabling automated real time state detection that can be used to plan maintenance or adjust performance envelopes.

Ultrasonic inspection methods have the ability to easily detect and locate damage and advanced signal analysis can characterize damage type and quantify its extent. Permanently mounting sensors within a structure ensures consistent coupling to produce repeatable signals for analysis.

Control of the ultrasonic wave modes actuated and understanding of the wave modes detected and sensor output support and advance advanced signal analysis capabilities. This knowledge is especially important in thin plate structures where multiple dispersive propagation modes exist. Methods have been developed to control and understand strain wave propagation modes actuated and sensed but most require specific frequency structure relations that cannot be easily altered, multiple transducers, or significant added volume and mass.

Assistant Professor Salowitz will present recent research into selectively coupling shear deforming piezoelectric transducers to specific ultrasonic wave modes and designing transducers for specific applications.

This presentation will cover and connect theory from piezoelectric constitutive equations, mechanics of materials, strain wave propagation, and interaction of strain waves with structural damage and other stimuli.

Friday November 22nd, 2019
11:00-11:50
1106 Mechanical Engineering