University at Buffalo
Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences

ENGINEERING SEMINAR

Research on Mechanical Metamaterials and Structural Instability

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Overview

Dr. Shim's group is interested in mechanical metamaterials, structural instability, and their applications in small-scale microstructures as well as large-scale structures. The current research topics include: amplitude dependent behavior of viscoelastic phononic crystals, pattern-transformation of soft granular crystals, snapping-induced damping, among others. In this seminar, Dr. Shim will provide a brief overview of his recent research activities, and Mr. Haque will discuss one of the research projects in details.

Wave Motions in Periodic Multilayered Composites Composed of Alternating Viscoelastic and Elastic Solids

In order to design phononic crystals whose band-gaps are located in low-frequency ranges, researchers commonly adopt low stiffness polymeric materials as a key constituent and exploit the high impedance mismatch between metals and polymers. However, there has been very little research on wave propagation at arbitrary angles in the sagittal plane of viscoelastic-elastic multilayered composites because there exist the intricate wave attenuation characteristics at the layer interfaces. This study analytically investigates wave propagation at oblique angles within alternating viscoelastic-elastic layered composites, where the attenuation of harmonic plane waves is found to occur only in the direction perpendicular to the layers. By using this wave propagation characteristic, we directly apply the semi-analytical approach employed in elastic multilayered composites to calculate the dispersion relation of sagittal plane waves in alternating viscoelastic elastic multilayered composites. The presented analysis demonstrates that wave dispersion relation in viscoelastic-elastic layered composites is distinctively different from the corresponding elastic counterpart, and highlights the importance of the viscoelastic modeling of polymeric materials in wave dispersion analysis.

Date: Friday, November 3rd, 2017 Time: 11.00 am
Location: 140 Ketter Hall, North Campus, University at Buffalo