AEROSPACE & MECHANICAL ENGINEERING

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INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Dr. Hsin-Haou Huang**
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TOPIC: **ACOUSTIC METAMATERIAL: RECENT ADVANCES AND APPLICATIONS**

DATE: Thursday, March 10, 2011

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

The field of metamaterial research has recently generated much excitement among physicists and engineers. Briefly, metamaterials are composite materials consisting of man-made microstructures and, hence, exhibiting unusual wave phenomena. One type of these novel materials is a composite material containing resonator-type microstructures periodically distributed in the host matrix. Our studies suggested a number of unusual dynamic characteristics such as the existence of negative effective mass density and extreme effective modulus in this type of metamaterials. On one hand, by use of metamaterials with negative effective mass density, waves can be selectively filtered. Moreover, the introduction of anisotropic mass density could lead to selection of wave modes. One can either suppress the extension-dominated wave or the shear-dominated wave, or even both, by properly tailoring the microstructures. Another application is the wave-mode conversion. For instance, an impinging longitudinal wave can be converted to a shear-dominated wave when passing through a metamaterial. On the other hand, by use of metamaterial with effective modulus, the composite metamaterial can be designed very stiff, very soft, and even with negative modulus, when subjected to a dynamic loading with certain frequencies. All the investigations indicated that the resonator-type composite metamaterials have capacity to mitigate, block, filter, redirect, select, and manipulate waves generated by dynamic loadings, including shock-induced stress waves and periodic vibrations, with proper designs of the microstructures. This talk presents the overall aspects of the recent advances for the resonator-type acoustic metamaterials. Potential applications based on the aforementioned phenomena are also discussed.

NOTE: ***If you are interested in meeting individually with Dr. Huang, please contact Evelyn at 631-5431***