1121-70-278 **Myungwon Hwang** (hwang125@purdue.edu), 585 Purdue Mall, West Lafayette, IN 47907, and **Andres F Arrieta*** (aarrieta@purdue.edu), 585 Purdue Mall, West Lafayette, IN 47907.
Nonlinear Dynamics of Lattices of Bi-stable Units with Spatially Varying Properties. Preliminary report.

The analysis of the dynamics of periodic arrays has attracted continued attention over the years due to its mathematical complexity and applicability in condensed matter and engineering. A particular class of lattices constituted by bi-stable elements have been extensively studied analytically and numerically, showing interesting dynamical behaviors. However, few experimental investigations validating the theoretical results have been presented. Recently, the experimental study of 1-D chains of bi-stable elements with magnetic inter-site forces has shown strongly nonlinear dynamics potentially enabling interesting properties, such as unidirectional wave propagation resulting in a mechanical behavior analogous to diodes. We extended these studies by introducing spatially varying properties, hence perturbing the periodicity of the lattices. Preliminary numerical studies show that relaxation of self-similarity conditions within the lattice allow for reversing the wave propagation direction at particular spatial locations as a function of the impending wave intensity. The introduced spatial variability enables to control the confinement of the wave to desired regions within the lattice as required, with applications for energy dissipation and harvesting. (Received July 19, 2016)