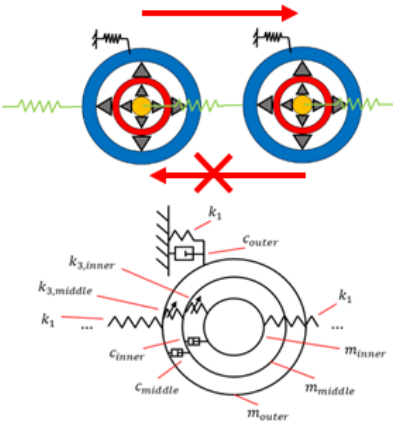
Postdoc Opening: Non-reciprocity in Acoustic Systems with Nonlinear Hierarchical Internal Structure and Asymmetry

Location: Georgia Tech, School of Mechanical Engineering, Atlanta, GA

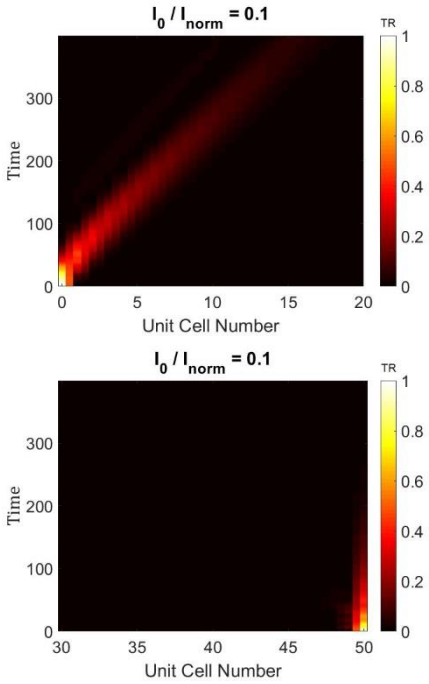
Advisor: Michael J. Leamy, Associate Professor

Funding Source: National Science Foundation (4 years; $2,000,000)

Summary: A highly-qualified and highly-motivated postdoctoral researcher is sought to perform analysis, computation, and experimental exploration of non-reciprocity in acoustic systems (e.g., 1D, 2D, and 3D lattices) with nonlinear hierarchical internal structure and asymmetry. The postdoctoral researcher will study dynamical systems exhibiting directed cross-scale energy transfers which break time reversibility and reciprocity both locally (within each of the system subunits) and globally (for the entire system viewed a whole). Non-reciprocal, large-to-small scale energy transfers mimic analogous nonlinear energy transfer cascades in Nature (e.g., turbulence). The proposed research aims to be transformative in the field of nonlinear acoustics, promoting a new paradigm for predictive design with nonlinear non-reciprocity through (i) the theoretical and experimental understanding of acoustic systems with nonlinear hierarchical internal structures; (ii) the uncovering of the combined role of asymmetry, disorder, nonlinearity and cross-scale directed energy transfers on non-reciprocity; (iii) the development of new approaches for fabricating, characterizing and experimentally testing non-reciprocal lattice materials combining multiple macro-to-nano scales; and (iv) the translation of these materials to new



Lattice with internal nonlinear multi-scales and coupling asymmetry resulting in global non-reciprocal acoustics (top); cell model (bottom).



Simulations for boundary impulses: spatiotemporal cell energy evolution for left (top) and right excitation (bottom).

technologies and acoustic devices that exploit and showcase transformative capabilities.

Qualifications: Candidates should have completed (or be close to completing) a PhD in Mechanical Engineering or closely related field, and should have graduated no more than 2 years previously. Candidates expert in wave propagation and nonlinear dynamical systems are especially encouraged to apply. Expertise with bifurcations, asymptotic methods, and nonlinear analysis is desired. A commitment of one to two years is required. US Citizenship is not required, but only researchers currently in the US or Canada will be considered.

Instructions for Applying: Please contact Michael J. Leamy at michael.leamy@me.gatech.edu. Please state your interest in the project and your qualifications, and please attach a curriculum vitae.

Timeline: The position will stay open until filled, but it is expected a hiring decision will be made by October of 2017.