Wave Propagation and Information Transport in Disordered Heterogeneous Media

May 13-15, 2020 – Boulder, CO

Overview

In recent years, the mechanics, materials science, and phononics research communities have devoted considerable efforts towards the pursuit of novel, unusual and superior mechanical properties through engineered assembly of constituents, commonly denoted as 'metamaterials'. Most of these assemblies consist of ordered, periodic assemblies. Parallel advancements in manufacturing and metamaterial design methodologies have led to renewed interest in the general topic of wave propagation in heterogeneous media, on ensuing complex phenomena, and on leveraging them for new or improved technologies and applications. Within this context, numerous open questions remain when looking beyond conventional ordered topologies, and when explorations extend to disordered, quasiperiodic, or randomly heterogeneous structures that admit unconventional wave behaviors. Phenomena like localization and its landscape, sub-diffusion, normal diffusion, super-diffusion, dissipation, nonlinearity, reduced energy transport, phase transitions, and non-reciprocity are actively investigated, with great potential of being controlled within the framework of heterogeneous materials. Material assemblies whose microstructure is intentionally designed, tuned, or controlled may induce wave phenomena that rely on deterministic and non-deterministic heterogeneities in space and/or time. Exploration of these phenomena and the potential for their control is an open, exciting area of research.

The proposed workshop provides a forum for researchers and engineers to discuss objectives, tools, fundamental questions and potential application areas for heterogeneous materials, structures, and related wave phenomena. This three-day, single session, interactive workshop will bring together experts from academia, industry, and government labs with the goal of identifying key research questions to highlight new areas of investigation based on the opportunities afforded by structural heterogeneities.

Topics

- Topological states of disordered surfaces and interfaces
- Localization in nonlinear, quasiperiodic, and disordered media
- Control mechanisms for wave phenomena
- Imaging of heterogenous systems and fractional calculus

Tentative Schedule

	May 13	**May 14**	**May 15**
Morning	Arrival & Registration	Disorder and Localization	Control Mechanisms
Afternoon	Disorder and Topology	Fractional Calculus	Adjourn and Departure
Evening	Social Event	Social Activity	

Workshop Website

https://www.colorado.edu/event/wdm2020

Location

Colorado Chautauqua, Boulder, CO (https://www.chautauqua.com)

Organizers

Todd Murray, Mahmoud Hussein and Massimo Ruzzene, University of Colorado Boulder

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