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MECHANICAL AND ACOUSTIC METAMATERIALS

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ABSTRACT

Metamaterials are designed media with periodic units comprised of tailor-made geometry and pattern aimed at accomplishing exceptional bulk properties which are unprecedented in conventional materials.

One of the biggest challenges for the field of mechanical metamaterials is the ability to identify, in a systematic and efficient way, structural geometries that endow metamaterials with desired functionalities. Many experimental studies have demonstrated unconventional properties through fabrication and testing of metamaterials designed ad-hoc. However, to design and predict the response of metamaterials, 'computational methods' play a key role. The use of numerical models can provide a concise description of complex phenomena, such as dynamical behavior and/or large, quasi-static deformations. In particular, Finite Element Method is a well-established approach in mechanics and yields accurate results for structural analysis of arbitrary geometrical shapes. However, when dealing with three-dimensional materials with complex geometries, the method can become computationally expensive. Advances in dynamic homogenization methods can play an important role in such cases.

This symposium aims at bringing together scientist and engineers working in the field of metamaterials with particular focus on (but not limited to):

- Theory and numerical modeling of structured materials
- Data-driven design of architected materials
- Geometrical representation of metamaterials
- Dynamic homogenization of metamaterials
- Noise & Vibrations reduction using metamaterials
- Adaptive metamaterials
- Experimental methods for metamaterial