

PHYSICS

Ateneo/DISAT - Bioinspired Elastic Metamaterials

Funded By	Politecnico di TORINO [P.iva/CF:00518460019] DISAT - Progetti
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Context of the research activity	Acoustic and Elastic wave propagation in complex structured materials
Objectives	A PhD position is available in the Nonlinear Elasticity and Metamaterials group of the Applied Science and Technology Department , Politecnico di Torino, to work on elastic metamaterials. These are artificial materials which exhibit unusual dynamic properties such as negative refraction, focusing, cloaking, band gaps, negative effective bulk modulus and mass density, topological protection, etc. The project should explore the possibility of using the principles of bioinspiration in the design of elastic and acoustic metamaterials, in particular incorporating elements of hierarchy, tunability and adaptivity in the system, assessing the role of viscoelasticity in soft materials and response to external fields (mechanical, optical, electromagnetic). Specific objectives are to investigate dynamic properties of biological systems displaying interesting dynamic properties; to pursue several related metamaterial designs at different size scales; to predict wave propagation phenomena associated with these architectures; to design simplified metamaterial geometries for specimen fabrication, and to experimentally validate the numerically predicted effects; finally, to apply the novel designs for applications in devices in different fields
Skills and competencies for the development of the activity	We are looking for motivated candidates with a degree in Physics, Mechanical engineering or equivalent. Experience in any of these topics is welcome: numerical modeling or experiments on elastic wave propagation, acoustic/elastic metamaterials, nonlinear elasticity. Preferred skills are finite element analysis or numerical tools in wave dynamics (numerical background), or ultrasonic measurement techniques and signal treatment and analysis (experimental background).