Séminaire du laboratoire PIMM

Vendredi 13 mars 2020 à 13h30 en Amphi A

Dr. Giuseppe ROSI
Laboratoire MSME UMR 8208 CNRS, Université Paris-Est Créteil Val-de-Marne

présentera dans le cadre du séminaire ses travaux intitulés :

Modelling wave propagation in non-centrosymmetric architectured materials

The study of elastic wave propagation is a fundamental tool in different fields, from non-destructive damage evaluation to ultrasonic imaging. Usually these techniques rely on inversion methods based on homogenised theories, that are valid only when the wavelength of the perturbation is considerably larger than the characteristic size of the heterogeneities of the materials. When the wavelength approaches the characteristic size of the architecture, an upscaling occurs, and mesoscopic effects can be transferred to the macro-scale. In this case, classic models used in the aforementioned inversion procedures can fail to predict the correct response and they need to be improved.

In this presentation, I will address the case of non-centrosymmetric architectures, i.e. those for which the unit cell does not have any centre of inversion. It will be shown that the effects on wave propagation in terms of dispersion and polarisation cannot be negliged in common applications involving elastic waves. It will be also show that, in order to describe these media using an equivalent homogeneous continuum, the use of an enriched continuum theory, such as the strain gradient elasticity, is mandatory. The particular example of the gyroid unit cell is detailed.

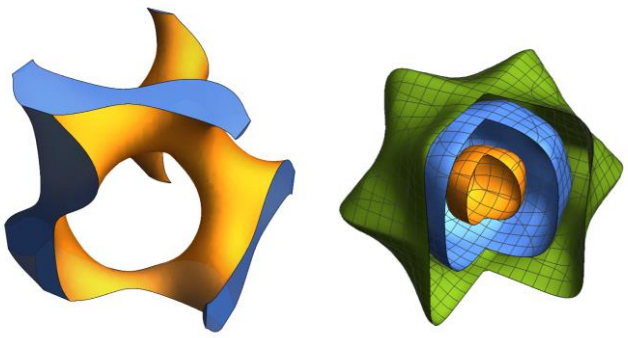

Fig. 1: Unit cell of a gyroid lattice and its slowness surfaces