DU MICRO AU MACRO EN MÉCANIQUE

FROM MICRO TO MACRO IN SOLID AND FLUID MECHANICS

Lecturers: **Alexandre DANESCU, Mathieu CREYSSELS**

| Lecturers : 12.0 | TC : 12.0 | PW : 0.0 | Autonomy : 0.0 | Study : 8.0 | Project : 0.0 | Language : FR

Objectives

The course concern the discrete-to-continuum elasticity, the up-scale from inhomogeneous continuum to "effective" material behavior and the basics of the kinetic theory of liquids and gazes. The last part introduces the topological protected elastic states.

Keywords :

Programme

1. Discrete to continuum elasticity : one-dimensional problems
2. Discrete-to-continuum elasticity : multi-dimensional problems
3. Inhomogeneous to effective constitutive relations : the scalar case (thermal diffusion)
4. Inhomogeneous to effective constitutive relations : the vectorial case (elasticity)
5. Case studied : negative Poisson ratio materials and/or
6. Case studied : mechanical behaviour of single wall carbonne nanotubes (SWCNT)
7. Topological protected states in elastic networks : the 1d case
8. Topological protected states in elastic networks : Berry connection and curvature and the bulk-boundary correspondance

Learning outcomes

   • - simplification of complex physical problems - formulation/computation of effective constitutive behavior in elasticity - understanding the interplay between microstructure geometry/physics and macroscopic mechanical behaviour

Independent study

Objectifs :

Méhodes :

Core texts

Assessment

Case studied results : 1/3 of the final mark
Written examination (2h) : 2/3 of the final mark