

Lyon 2025

MS- 3-1

Mini-symposium title

3-1 – Homogenisation and Continuum Strategies for Multiphase Materials

Organisers

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Mini-symposium description

The MS invites contributions on continuum descriptions for the material response of microstructured solids. Microstructured solids of engineering and scientific interest are considered in a very broad sense: composites, polycrystals, architected or lattice materials, porous or micro-cracked solids, etc. Their material response at either small or large deformations can be of purely mechanical (elastic, viscoplastic, elastoplastic, etc.) or coupled physical (thermo / chemo / hydro / magneto / ... / mechanical) origins. Multiscale methods for developing these continuum descriptions include mean-field homogenization techniques, full-field numerical simulations, data-driven approaches, and may also include experiments. Scientific developments and engineering applications are welcome.

Representative topics include:

- Full-field simulations based on the Finite Element Method or the Fast Fourier Transform;
- The Method of Cells or Sub-Cells, the Transformation Field Analysis;
- Asymptotic or mathematical homogenization theory;
- Mean-field homogenization techniques based on direct or variational approaches;
- Strategies based on Machine Learning and AI;
- Discrete-to-continuum modelling by molecular dynamics or atomistics;
- Applications of multiscale descriptions to structural calculations.