Heterogeneous material modelling: statistical characterization, digital reconstruction, and numerical simulation

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ABSTRACT

Heterogeneous materials such as soil, rocks, concrete, composites, and biological tissue are commonly encountered in both natural environment and engineering applications. Such materials typically comprise multiple material phases randomly distributed over the medium, and as a result they often exhibit multiscale features, i.e. random at the microscale and deterministic at the macroscale. The intrinsic random morphology of heterogeneous materials often has a strong influence on their physical behaviours, e.g. mechanical, thermal, electrical, and transport responses. With the rapid development of imaging techniques, it is increasingly more affordable to obtain high resolution microstructures for practical heterogeneous materials, which makes high-fidelity numerical simulation a feasible approach to study the fine cross-scale physics associated with heterogeneous materials.

This mini-symposium welcome widely research works in heterogeneous material modelling, which covers statistical characterization, digital reconstruction, and numerical simulation. The topics include, but are not limited to:

* Materials with intrinsic heterogeneity: rocks, composites, granular matters, porous media, and many more
* Statistical characterization of heterogeneous media
* Digital reconstruction (or morphological modelling) of heterogeneous materials
* Numerical modelling of heterogeneous materials
* Multiscale modelling of heterogeneous materials
* Multi-physics problems in heterogeneous materials
* Design / Optimization of composite structures considering uncertainty
* Methods for improving the efficiency of Monte Carlo simulation