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FAST FOURIER TRANSFORM-BASED, FULL-FIELD SIMULATIONS OF HETEROGENEOUS MATERIALS: THEORY, IMPLEMENTATION AND APPLICATIONS
TRACK 200 – ADVANCED DISCRETIZATION TECHNIQUES

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ABSTRACT

Twenty years on, the number of yearly citations to the seminal papers of Moulinec and Suquet [1, 2] continues to grow steadily. These papers introduced so-called "FFT-based homogenization techniques", a family of numerical homogenization methods in solid mechanics. These methods rely on a discretization of the microstructure over a regular grid, an equivalent formulation of the mechanical boundary-value problem as an integral equation (the Lippmann–Schwinger equation), and a simple and efficient implementation of the discretized problem using the fast Fourier transform (FFT).

The present mini-symposium intends to offer a forum to users and developers of these techniques. We welcome contributions that discuss: applications to practical problems in various settings (material and/or geometric non-linearities, cracking, . . .), coupling with other grid-based methods (phase-fields, among others) for multi-physics simulations, coupling with 3D imaging techniques (such as X-ray microtomography), mathematical issues (discretization, preconditioning, . . .), as well as implementation issues (memory and CPU efficiency). For cross-pollination purposes, we also welcome contributions on methods that are similar in spirit (work on grids, partly in Fourier space) but do not rely on the discretization of the Lippmann–Schwinger equation.

REFERENCES

[1] Moulinec, H. and Suquet, P. A fast numerical method for computing the linear and nonlinear mechanical properties of composites. *CR Acad. Sci. II* (1994) **318**:1417–1423.

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