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MULTISCALE METHODS AND COUPLED PROBLEMS

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ABSTRACT

Accurately predicting the macroscopic behaviour of heterogeneous materials while accounting for their complex microstructures remains a significant challenge in materials science and engineering. By determining effective properties that represent the overall response of the material, homogenisation enables efficient simulations and analysis at the engineering scale. This approach has found widespread applications in diverse fields, including the design of composite materials, the analysis of polycrystalline aggregates, and the modelling of biological tissues. In many real-world applications, materials are subjected to coupled physical phenomena. Understanding the coupled behaviour of these is crucial for optimising performance of devices and structures. The coupling effects, further complicated by the intricate microstructures of heterogeneous materials, pose significant challenges for accurate modelling and prediction.

This minisymposium focuses on recent advances in multiscale modelling and coupled problems, with emphasis on but not limited to:

- *advanced homogenisation techniques for complex microstructures (asymptotic, mathematical homogenisation theory ...)*
- *efficient computational methods for the solution of cell problems (FFT, domain decomposition methods, reduced order modelling ...)*
- *micromechanical modelling of complex phenomena (crystal plasticity, phase transformations, damage mechanics ...)*
- *multiscale modelling of coupled phenomena (mechanical, thermal, electrical, chemical ...)*
- *multiscale modelling of structure-property relations*
- *generation and characterisation of representative volume elements (RVEs)*

By bringing together young researchers from diverse backgrounds, this minisymposium aims to foster interdisciplinary collaboration in multiscale modelling and coupled problems.