

S07 Multi-scale modelling

Organizers:

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The objective of this mini-symposium is to gather researchers working on different aspects of modelling of processes and phenomena occurring at various scales, from nano through micro and mezo to the macro scale, and to provide a platform for exchange of opinions and experience. The symposium is focused on the applications of multiscale modelling techniques to simulate material behaviour in the wide range of existing and future industrial problems involving processing of any type of material, including metals, composites, ceramics and cements. Contributions on topics such as materials characterization and structural dynamics are also welcome.

The scope of the mini-symposium includes, but is not limited to:

- Multiscale techniques in static and dynamic processes and phenomena.
- Multiscale approaches constructed within the mesh-based (XFEM, GFEM, FE2), mesh-free (PD, SPH, MGM) or grid techniques.
- Multiscale analysis techniques based on various micro/nanoscale analysis methods and concepts, e.g. Monte Carlo (MC), Cellular Automata (CA), Vertex, Molecular Dynamics (MD), Molecular Statics (MS), Level set (LS), Phase Field (PF), Crystal Plasticity (CP), Crystal Plasticity Fast Fourier, Homogenization and Computational Homogenization (CH) methods, spectral methods (Fourier, wavelet), etc.
- Machine learning techniques in multiscale modelling.
- Analysis of multiscale schemes: stability, accuracy, complexity, computing costs, etc. Applications of High-Performance Computing.
- Development of new multiscale approaches, incorporating optimization and inverse techniques.
- Multiscale modelling of phenomena such as solidification, microstructure evolution, phase transformations, wave propagation, crack propagation, strain localization, etc.
- Application of multiscale modelling to existing and future industrial problems related to melting, casting, welding, laser treatment, joining, forming, semi-solid metalworking, injection moulding, molecular beam epitaxy, and others.