Abstract

Oberwolfach Workshop:

Computational Multiscale Methods

Dates:

27 Apr - 2 May 2025   (Code: 2518)

Organizers:

Björn Engquist, Austin
Daniel Peterseim, Augsburg
Barbara Verfürth, Bonn
Yunan Yang, Ithaca

Many scientific and engineering problems exhibit complex interactions over a wide range of inseparable scales in space and time. Direct numerical simulations to solve such multiscale problems are often beyond current computational capabilities. The difficulties are exacerbated by the presence of uncertainty, randomness and disorder and are hardly manageable for multiscale inverse problems. Therefore, the simulation of novel phenomena using multiscale models requires a new generation of multiscale computational methods. These must account for under-resolved scales, cross-scale couplings, and stochasticity in a hierarchical and adaptive manner and be able to integrate probabilistic, data-driven, and machine learning approaches. The workshop aims to foster the development of a new generation of efficient multiscale computational methods and their rigorous mathematical and numerical analysis so that reliable and fast simulations of challenging multiscale problems from applications eventually become a reality.