

# Preface

The recent rapid progress in multiscale computations has been facilitated by modern computer processing capability and encouraged by the urgent need to accurately model multiscale processes in many applications. For further progress, a better understanding of numerical multiscale computations is necessary. This understanding must be based on both theoretical analysis of the algorithms and specific features of the different applications.

We are pleased to present 16 papers in these proceedings of the workshop on Numerical Analysis and Multiscale Computations at the Banff International Research Station for Mathematical Innovation and Discovery, December 6–11, 2009. The papers represent the majority of the presentations and discussions that took place at the workshop. The goal of the workshop was to bring together researchers in numerical analysis and applied mathematics with those focusing on different applications of computational science. Another goal was to summarize recent achievements and to explore research directions for the future. We feel that this proceeding lives up to that spirit with studies of different mathematical and numerical topics, such as fast multipole methods, homogenization, Monte Carlo techniques, oscillatory solutions to dynamical systems, stochastic differential equations as well as applications in dielectric permittivity of crystals, lattice systems, molecular dynamics, option pricing in finance and wave propagation.

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