
MINISYMPOSIUM 8: Robust Methods for Multiscale PDE Problems

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This minisymposium focused on recent developments in analysis and implementation of preconditioners for elliptic problems with highly variable multiscale coefficients, including cases where the coefficient variation cannot be effectively resolved by a practical coarser mesh. Many examples arise, for example in deterministic and stochastic models in hydrogeology, and in oil reservoir modeling. Standard coarsening techniques based on polynomial interpolation do not work well for such problems and in this minisymposium we will focus on recently proposed better techniques, such as multiscale finite element coarsening, optimized interface preconditioners, deflation, and algebraic approaches which are designed to accommodate coefficient behavior.

The talks in the minisymposium covered various topics, including algebraic coarsening methods for non-overlapping domain decompositions; a general theory of robustness for multilevel methods; application of multiscale finite element methods to coarsening; a new theory of aggregation methods for problems with highly variable coefficients and application of multiscale methods in diffusion and absorption in chloroplasts.