Numerical Multiscale Modeling with Applications to Material Science

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We will discuss a number of techniques for meeting the computational challenges of multiscale phenomena in material science. One focus will be the heterogeneous multiscale method (HMM), which is a framework for coupling of macro and micro-scale models. Local micro-scale simulations give missing data to a large-scale model in order to achieve the accuracy of the more detailed formulation and the efficiency of the macro-scale simulation. We will discuss some applications, for example, the use of local kinetic Monte Carlo systems for macro-scale epitaxial growth.