Accuracy and Stability of the Coarse Time-Stepper for a Lattice Boltzmann Model

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Abstract

The equation-free framework for multiscale computing is built around the central idea of a coarse time-stepper, which approximates a time integrator for an unavailable macroscopic model using only a microscopic simulator. In this talk, we study the accuracy and stability of the coarse time-stepper when a lattice Boltzmann model for one-dimensional diffusion is used as the microscopic simulator. For the model problem we derive analytical expressions for the accuracy and stability, which in turn enable to compare the influence of various aspects involved in the construction of the coarse time-stepper. We also demonstrate that once an appropriate coarse time-stepper is constructed, it can be accelerated using the recently proposed teleprojective integrators or the multistep state extrapolation methods.