

Student/Master Project: Coupling a Direct Numerical Simulation (DNS) solver to the Macro-Micro-Coupling (MaMiCo) tool via the preCICE coupling library

Description: Molecular-continuum simulations have become a valuable tool in recent years, where two different scales in time and space are employed for the continuum (macroscopic) solver and the particle (microscopic) solver. The Macro-Micro-Coupling (MaMiCo) tool is an open-source coupling tool for such multiscale simulations which allows the re-use of one's favorite MD and CFD solvers. It provides various methods and functionalities to manage and steer the coupling algorithm between the two. Furthermore, we are developing a DNS simulation tool as our CFD solver. In this project the DNS solver should be coupled to the MaMiCo tool through a third-party coupling library called preCICE. You will first make yourself familiar with the DNS solver, MaMiCo and preCICE. Then, you couple the DNS solver to preCICE such that it can interact with the MaMiCo tool and the microscopic solver.

Prerequisites:

- Very good C/C++ programming skills and solid command on MPI
- Basic knowledge in gas dynamics, fluid mechanics
- Experience in handling bigger software frameworks is a plus

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References:

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