

Student/Master Project: Development of Multi-Block Meshes for an In-house Direct Numerical Simulation (DNS) Solver

Description: We are developing an in-house DNS solver based on a structured Cartesian grid. The code is written in C++. For now, it can only solve on one single structured Cartesian block mesh, which means that the entire computational domain needs to be defined as a single block mesh. In this work, the DNS solver shall be modified, such that it can handle multiple block meshes. You start with familiarizing yourself with the code and basic understanding of the mathematical and physical formulations of the code. Then you develop the solver further such that it can handle multiple block meshes in a way that each block mesh interacts (in terms of transferring data) with its neighboring block meshes at their common interfaces. In the last step you test the development on a complex geometry.

Prerequisites:

- Good knowledge in C/C++ programming
- Basic knowledge in parallel computing (e.g. MPI)
- Good knowledge in gas dynamics, fluid mechanics
- Good CFD skill is a plus

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References:

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- [3] D. Knight, H. Yan, G.A. Panaras, and A. Zheltovodov. Advances in CFD Prediction of Shock Wave Turbulent Boundary Layer Interactions, Progress in Aerospace Sciences 39(2-3), pp. 121-184, 2003