

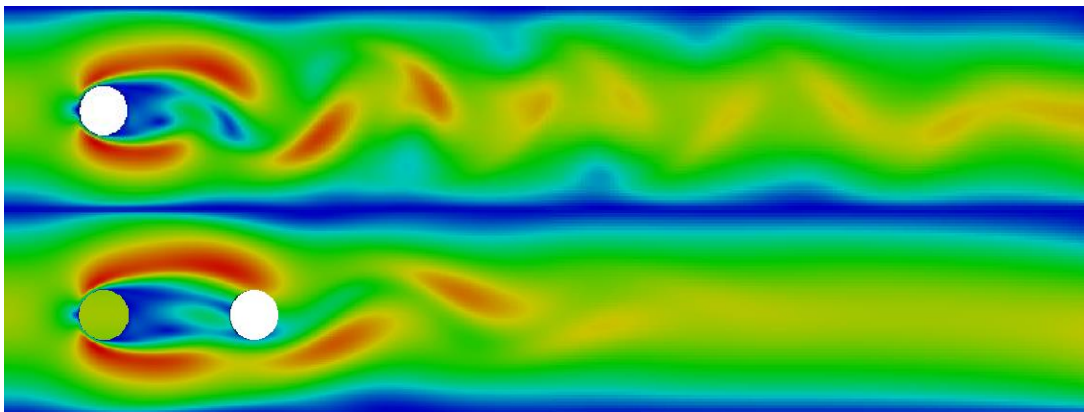
Software Lab:

Modeling: ★★☆☆☆
Mathematics: ★★★★★
Programming: ★★★★★

Re-Meshing Strategies for Moving Geometries ensuring Numerical Stability

Setting

Moving geometries are frequent in nature, caused for example by deformation, displacement or erosion due to external forces. When simulating moving geometries in the context of fluid dynamics, one has to deal with two main problems. First the computational mesh has to be adjusted or generated from scratch to represent the new geometry correctly. And second, moving geometries cause problems with the continuity (mass, energy, momentum) of the surrounding fluid. They suppress fluid where they move to and leave an empty space where they come from, leading to problems in numerical stability. This Software Lab aims to find suitable solutions to be implemented in the chair's fluid dynamic framework.



Task

- Design and Implement a re-meshing strategy that only affects the parts of the code's distributed data structure which are affected by the change in geometry
- Enhance the numerical framework to be able to deal with numerical issues caused by continuity violations
- Test the implemented functionality on a chosen engineering application

Supervisors

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References

- [1] Jérôme Frisch, Towards Massive Parallel Fluid Flow Simulations in Computational Engineering, Doctoral Thesis, 30 September 2014.
- [2] Kristof Unterweger, CFD Simulation of Moving Geometries Using Cartesian Grids, Master's Thesis, 2009