Chair of Structural Analysis
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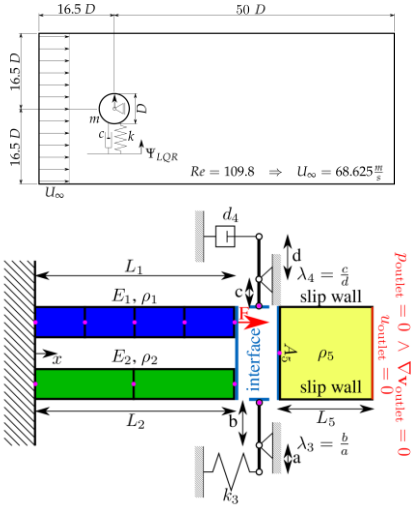
Software Lab:

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

A segregated Finite-Volume CFD Solver with Interface Jacobians



Setting

Co-simulation is a prominent method to solve multiphysics problems. Multiphysics simulations using a co-simulation approach have an intrinsic advantage. They allow well-established and specialized simulation tools for different fields and signals to be combined and reused with minor adaptations in contrast to the monolithic approach. However the partitioned treatment of the coupled system poses the drawback of stability and accuracy challenges. If several different subsystems are used to form the co-simulation scenario these issues are especially important.

An Interface Jacobian based Co-Simulation Algorithm (IJCSA) has been developed to overcome the stability and accuracy challenges.

Within this project the IJCSA should be implemented for a 2d Fluid-Structure Interaction problem.

Task

Create a (Matlab/C++) application

- A 2D laminar incompressible transient CFD solver for unstructured grids should be implemented
- Compute the Interface Jacobian of the CFD solver
- Perform a Fluid-Structure Interaction Simulation

Supervisor

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References

[1] S. Sicklinger, V. Belsky, B. Engelmann, H. Elmqvist, H. Olsson, R. Wüchner, K.-U. Bletzinger, Interface Jacobian based Co-Simulation, *International Journal for Numerical Methods in Engineering*, accepted.