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Fluid-Structure Interaction based on Lattice Boltzmann and p-FEM BENJAMIN AHRENHOLZ, SEBASTIAN GELLER, MANFRED KRAFCZYK, TU Braunschweig — Over the last decade the Lattice Boltzmann Method (LBM) has matured as an efficient method for solving the Navier-Stokes equations. The p-version of the Finite Element Method (p-FEM) has proved to be highly efficient for a variety of problems in the field of structural mechanics. The focus of this contribution is to investigate the validity and efficiency of the coupling of two completely different numerical methods to simulate transient bidirectional Fluid-Structure Interaction (FSI) problems with very large structural deflections. In this contribution the treatment of moving boundaries in the fluid solver is presented, the computation of tractions and displacements on the boundary as well as the explicit coupling algorithm itself. In addition, efficiency aspects of the two approaches for two- and three-dimensional laminar flow examples at intermediate Reynolds numbers are discussed. Finally we give an outlook on modeling turbulent FSI problems.

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