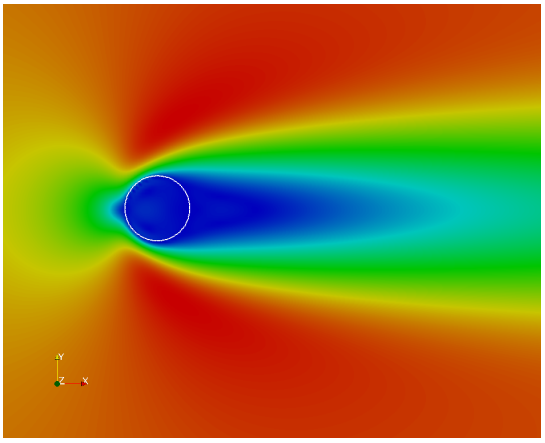
Masterarbeit	Referenz-Nr.: LSS-M??	Beginn: as soon as possible

Computing drag and lift force of obstacles in a fluid flow using the Lattice Boltzmann method

Description

The Lattice Boltzmann method is rapidly becoming a robust alternative to the Navier-Stokes equations in computational fluid dynamics (CFD) due to many advantages, in particular locality of calculations and parallel capability. LBM has been already successfully applied to many multi-phase and multi-component applications.



The bounce-back boundary condition is the most popular boundary condition to treat obstacles or walls in the computational domain.

A LBM code (called ALBORZ) has been developed at the Laboratory of Fluid Dynamics and Technical Flows. In the current version solid objects are modeled by bounce-back boundary conditions. However, the outer obstacle surface is assumed to be stair-wise in this approach, so that a very fine resolution is necessary to properly capture flow characteristics near curved obstacles. The main purpose of the current project is to extend the LBM code to consider curved boundaries in order to get a higher accuracy and reduce computational costs. Furthermore, drag and lift forces should be calculated using the alternative momentum exchange method, including comparisons with previous studies.

Major steps

- Literature review on LBM and momentum exchange method
- Good understanding of the available LBM code of LSS group
- Developing the code to include circular objects and calculate the drag and lift force
- Acquiring results and validation by comparison with former studies

Prerequisites

- Self motivation
- Good knowledge of Computational Fluid Dynamics (CFD)
- Good computer programming skills, preferably with C++ (MATLAB/Fortran are also appreciated)
- Good English proficiency

German and International students are welcome to apply.

Supervision:
M.Sc. Amir Eshghinejadfard
(amir.eshghinejadfard@st.ovgu.de,
Room 213, Building 3)
Prof. Dominique Thévenin