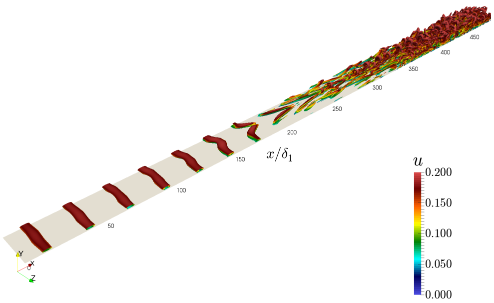
Bachelor/Master Thesis: Influence of Geometry on Blowing and Suction Efficiency in Laminar Boundary Layer Flow

Turbulent friction drag is the main component of the overall drag in modern day aircraft and therefore there is great interest in reducing it trough passive and active techniques. One technique to change the friction drag are blowing and/or suction at the wall. In numerical simulations the blowing or suction of fluid from the wall is often prescribed by a modified boundary condition, neglecting the any real geometry that is necessary to enforce blowing or suction. Therefore, in this thesis you will set up a fully resolved simulation of a laminar boundary layer with blowing and/or suction applied by different methods. Besides a simple boundary condition the full resolution of multiple holes trough which fluid is injected into the flow shall be computed.

In the scope of this thesis you will have to make yourself familiar with laminar boundary layers and blowing/suction approaches. The simulations will be conducted using the fully parallel in-house Cartesian mesh solver ZFS. You will have to implement a modified wall boundary condition for blowing or suction and for the geometry-resolved simulations you will have to create a geometry (CAD) which is then simulated. The results of the different techniques are then compared and the efficiency of each approach is evaluated. You will conlude your work by writing the thesis.



If you are interested or if you would like to have some additional information on this thesis write me an email and I'll be happy to answer all upcoming questions.

What you can learn:

- Build up a profound knowledge of wall-bounded flows.
- Gain deep knowledge of computational fluid dynamics (CFD) and C++ by using and developing the high-fidelity inhouse flow solver ZFS.
- Working with large datasets and massive parallel simulation techniques.

Requirements:

- Basic knowledge of fluid dynamics and interest to learn more.
- Basic knowledge in programming is recommended
- Motivation to work independently and to develop own solutions.

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