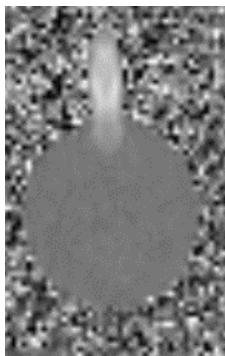
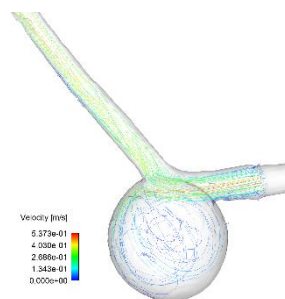


TITLE: Comparison of MRI-based WSS estimation methods

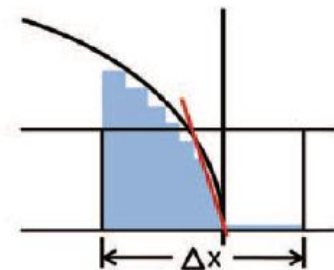
Flow-dependent parameters, such as wall shear stress (WSS), are meant to have an influence on the growth and rupture probability of aneurysms. Phase-Contrast Magnetic Resonance Imaging (PC-MRI) *in-vivo* measures blood flow by encoding the velocities in the phase of the acquired MR signal, whereas direct assessment of additional parameters is not possible. The calculation of wall shear stress out of the measured velocity field is difficult due to uncertain geometric boundaries and low spatial resolution. Existing reconstruction methods shall be identified (e.g. [1]) and selected for implementation. Based on a reference data set, the reconstructed WSS values shall be compared with solely numerically generated, as well as assimilated WSS fields.



velocity encoded in phase
difference images



three-dimensional velocity
field



MRI-based WSS estimation [1]

Tasks in detail:

- Literature research on reconstruction methods for WSS out of PC-MRI data
- Selection and implementation of WSS reconstruction algorithms
- Summary of results and comparison with CFD and assimilated data

Prerequisites:

- Good programming skills (preferably Python or Matlab)
- Self-dependence and reliability

Supervisor:

M. Sc. Franziska Schulz (franziska.schulz@ovgu.de)
PD Dr.-Ing. Gábor Janiga

Begin: as soon as possible

[1] Petersson, S. Dyverfeldt, P. Ebbens, T. Assessment of the accuracy of MRI wall shear stress estimation using numerical simulations. *Journal of Magnetic Resonance Imaging* 2012; 36:128-138