Improving Ultrasound velocity measurement accuracy using vector flow mapping (VFM) technique: A parametric study

Background:

In-vitro investigation of fluid dynamics in vascular models and implants demands an accurate measuring system. With modern ultrasound devices and their ability to perform vector flow mapping using the Doppler effect, the influence on the fluid dynamics in a stented vessel as well as in an aneurysm can be visualized and analyzed. However, to ensure the reliability of the measurements, a parametric study needs to be performed to assess the influence of each parameter on the accuracy of the measurements according to Hagen-Poiseuille.

Objectives:

1. Evaluate the current ultrasound velocity measurement setup and identify potential sources of error
2. Design and conduct a parametric study to systematically investigate the impact of various parameters on measurement accuracy
3. Propose and implement modifications or adjustments to the measurement setup to reduce measurement errors.
4. Verify the effectiveness of proposed improvements through experimental testing and data analysis
5. Provide recommendations for best practices in ultrasound velocity measurement for future experiments

Responsibilities

Conduct a literature review to understand the state of the art in VFM velocity measurement
Set up and perform the parameter studies using the experimental flow system
Perform data collection and analysis.
Collaborate with laboratory staff and experts to implement modifications and improvements.

Supervisors:

M.Sc. Ashkan Shiravand

Start: Immediately