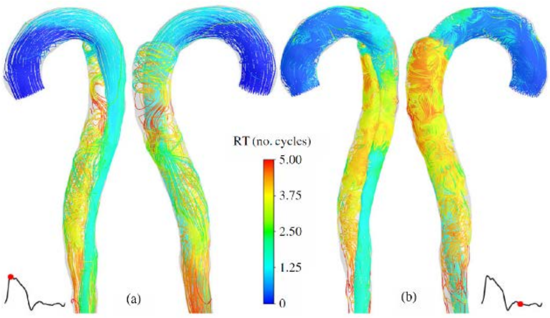
PhD position: Numerical simulation of blood flow-induced conductivity changes in the human aorta



C. Menichini et al. "Predicting false lumen thrombosis in patient-specific models of aortic dissection." J. R. Soc. Interface, 13:20160759, 2016.

Aortic dissection (AD) is usually initiated by a small tear at the inner layer of the aorta, which then gradually propagates within the aortic layers leading to a so-called false lumen. The presence of a false lumen changes the local hemodynamics in the aorta, and consequently causes tissue remodeling (degradation) and thrombus formation and growth.

TU Graz is funding the joint research project "Mechanics, Modeling and Simulation of Aortic Dissection" as a Lead project of the university. The goal of this project is to use engineering science to develop advanced computational tools and algorithms and to assist clinicians with the diagnosis, treatment, and management of AD patients. The Lead project finances 10 positions for PhD candidates.

For details about the lead project see http://www.biomechaorta.tugraz.at/.

Open PhD position for the sub project „Tomography method to verify modeling"

It has been observed that the electric **conductivity of blood** is strongly influenced by the **blood flow**. This opens the possibility of using tomography techniques based on the distribution of the electric conductivity to detect changes in the blood flow, and hence indicating failure.

Electrical Impedance Tomography is the non-invasive imaging method of choice for the proposed application. Because of the complicated geometry and intricate material properties the **electromagnetic field analysis** will be carried out numerically by using the **finite element method**.

To identify the conductivity distribution inside the body, and hence to verify the rupture process, the inverse problem has to be solved. This means that the results of the finite element simulation (a forward problem) must end up meeting the observations (measurements) on the body surface. Different measurement configurations (e.g., different electrode positions or applying multiple frequencies) will be simulated to investigate possible measurement set ups.

A successful candidate should have a qualified **Masters in electrical engineering or in related fields** such as biomedical engineering and physics. Prior experiences in the field of **electromagnetic simulations and high performance computing** are beneficial, but not required.

Starting Date: January 1, 2018
Duration: 3 years
Details: https://www.tugraz.at/projekte/aortic-dissection/open-positions/#c148168

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