**ABSTRACT**

## Modelling of aorta geometry for Computational Fluid Dynamics solvers

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The analysis and assessment of blood flow and its related hemodynamic parameters are indicated to be quite useful for the diagnosis, treatment, even the prevention of multiple diseases. In silico approach of the study of these blood flow characteristics through computational fluid dynamics is being widely used in recent years.

The study that was made in order to create a numerical model and run a simulation of a three dimensional fluid flow inside a realistic geometry of a human aorta is presented in this thesis. For the needs of the current study methods of acquiring geometry data were investigated. Focus was made on part of the stereolithography model utilized, more specifically on the ascending aorta, aortic arch and the thoracic part of the descending aorta. The tool that was employed for geometry processing, mesh generation, definition of the problem and the initial algorithm trials for flow simulation is the open source software for computational fluid dynamics OpenFOAM. Computational flow solution in the complex geometry was attempted using icoFoam and pisoFoam solvers for a time-invariant input condition. The adjustments to the default settings of various parameters and the behavior of said solvers were recorded in detail.

The computational trials of the present work demonstrate the difficulty of the problem in terms of achieving convergence, especially for gradually reduced viscosity, computational costs and the selection of an appropriate algorithm.

Keywords

[CFD, OpenFOAM, Aorta]