Hemodynamic Simulations of Implanted Multilayer Flow Modulator

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Abstract

The aorta is the largest artery in the human body, when it becomes abnormally large or balloons outward we are in presence of an aortic aneurysm.
Ruptured aortic aneurysm is one of the commonest cause of mortality in developed countries. To avoid it interventional repair is an effective treatment.
In the recent years the development of new therapies, such as stent implantations, allows to perform this treatment more and more safely
establishing it as good alternatives to traditional surgeries.

Stents are tubular device composed of fine wire materials,
that can be inserted through a thin catheter and expanded into a predetermined shape once they are guided into place.
It is in this new cardiovascular treatment that the Cardiatis multilayer (MFM - Multilayer Flow Modulator) stent finds place. The unique quality of
this device is that it decreases flow velocity within the aneurysm vortex while improving laminar flow in the main
artery and also to surrounding vital branches due to its permeability. Characteristic that we aim to simulate.

The goal of our study is to investigate the physics and the patient recovery after Cardiatis MFM stents implantation.
Modelling of the blood flow through the human aorta with implanted MFM stent and its corresponding stress are performed using COMSOL Multiphysics®.
While patient specific geometries are reconstructed from imaging data (CT-scan) are used as onset with imposed realistic boundary condition.