CASTS TALKS

Special Program in Applied Mathematics and Applied Mechanics

Venous blood flow. An example of fluid-solid interaction.

Prof. Marc Thiriet

2017 - 11 - 22 (Wed.)
15:00 - 18:00
308, Mathematics Research Center Building (ori. New Math. Bldg.)

The blood circulation is made up from 2 apposed and synchronous pumps and 2 serial circuits, systemic and pulmonary circulation, the former exiting the cardiac pump from the left ventricle and entering the right atrium, the latter exiting from the right ventricle and entering the left atrium. Arteries are blood vessels through which ventricles expel blood; veins are blood vessels that ensure blood return to the heart. Arteries and veins have a circular and elliptical cross section, respectively. Arteries are distensible, whereas veins are both distensible, enabling blood storage, and collapsible. Walk enhances venous return from extremities of inferior limbs, but also provokes backflow. Venous valves are aimed at limiting backflow magnitude. Therefore, venous flow dynamics is strongly coupled with the wall mechanics. A monolithic solver has been developed to simulate flow in valved veins in the framework of the free sofware FreeFEM++. Verification and validation stages used proposed benchmarks of the literature.