PHILIPS

Quantification of calcified aortic valve dynamics

Duration: 6 months
Preferred start date: February 2019
Localization: Suresnes (92)
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Host entity

Philips is a world leader in medical imaging. Its products cover the full range of imaging modalities: X-Rays, MRI, Ultrasound, CT, etc. The company is internationally recognized for the excellence of its technology, developed within innovative research groups.

Philips Research Paris - Medisys is based in Suresnes (92) and is dedicated to medical image processing. The team, with about thirty researchers and engineers, is focused on delivering the most innovative solutions in the domain and is in close contact with famous universities and clinical sites in France and abroad.

Internship description

The aortic valve is one of the four heart valves, located between the left ventricle (LV) and the aorta. This valve is responsible of maintaining a unidirectional blood flow from the LV to the aorta. The aortic valve is the most susceptible heart valve to develop a pathological condition, as it sustains the largest pressure difference between the left ventricle and the aorta. Aortic valve stenosis is a major disease, where the valve fails to open fully due to the presence of calcifications on the valve leaflets.

For diagnosis, therapy planning, treatment and follow-up of valvular pathologies, medical images are essential. Depending on the stage in the patient care cycle, the required image modality and set up can change. In this context, the numerical simulation can be of help to understand valvular deficiencies, in particular, the influence of calcification in the aortic valve. The acquired knowledge and tools can be of help to develop dedicated tools to improve medical care.

The purpose of this internship is to develop a numerical model of the aortic valve, with and without calcifications. By studying these models, the second step is then to provide a deep understanding of the valve dynamics and to characterize its functioning, especially when calcifications are presented. Finally, the internship aims to transfer the acquired knowledge to medical images for the quantification of calcified valves.

Candidate profile

- Training : Third year of engineer school/ Master 2 Recherche, with specialty in applied mathematics
- Image processing competencies, for 3D and temporal acquisitions
- Solid knowledge of classical mechanics and numerical modeling (FEM for instance)
- Basic knowledge of image processing, especially in medical images
- Programming skills: C++ and python
- Good communication skills and ability to work in a team