PhD thesis proposed by Yuemin Zhu

Spectral CT: feasibility study of heart diseases

Heart diseases remain one of the most serious health problems and the leading cause of death in the world. Despite decades of fundamental and clinical researches, customized treatment of heart diseases is still a major challenge. The bottleneck is to be able to quantify the drug efficiency, which is known to be patient-dependent. To tackle this problem, an imaging modality able to visualize the spatial distribution of drugs inside the myocardium is essential.

The PhD thesis aims to investigate the feasibility of using a novel imaging modality, spectral X-ray Computed Tomography (CT) combined with the use of specific contrast agents in order to find new approaches to the diagnosis, monitoring and treatment of heart diseases. To this end, the work consists mainly in developing robust and rapid reconstruction of multi-energy CT images, studying appropriate material decomposition algorithms, and exploring the combination of structural information from diffusion magnetic resonance imaging (dMRI) and functional information from spectral CT.

The present study will be carried out through strong collaborations with other colleagues of Creatis, with the laboratory LVA (P. Duvauchelle & V. Kaftandjian) of INSA Lyon, and in the international laboratory LIA CNRS “Metislab”.

More details on the INSA Institute and LVA laboratory

INSA Lyon is the most important university of Science and Technology in France and one of the major universities in Europe. With its 500 professors and assistant professors, INSA Lyon trains about 600 PhD students in all the engineering domains including computer science, telecommunications, electrical and electronic engineering, chemistry, biology, mechanics, etc. The laboratory Creatis is one of the most important medical imaging research centers in France, and one of the rare laboratories in France which are both a CNRS unit and the Inserm unit. In the past 5 years, our group has published more than 40 papers in the SCI journals and 40 papers in international conferences, in the field of the proposed topic.

Some recent selected publications