Master Internship position at the Center for Biomedical and Healthcare Engineering, Mines Saint-Etienne – Laboratoire SAINBIOSE INSERM UMR 1059

BIOMECHANICAL CHARACTERIZATION AND MODELLING OF ATRIAL TISSUE

Keywords: Mechanical testing, Aortic valve, Biomechanics

Academic context: The research group at Mines Saint-Etienne leads major international research projects in the domain of soft tissue and fluid biomechanics of the cardiovascular system. This internship is part of a larger collaborative project between Mines Saint-Etienne and the University Hospital of Saint-Etienne.

Scientific context: The biomechanics of the Left Atrium (LA) represents an important gap in the understanding of different cardiovascular pathologies. Recently, atrial cardiomyopathy was defined as any electrical, structural and/or mechanical dysfunctions of the left atrium. Structural and electrical changes in the LA are interconnected and will directly impact the hemodynamics in the cavity. The major risk is that the modification of the hemodynamics in the LA results in thrombogenic flow patterns. The overall goal of the project is to understand how the modification in the structure of the LA wall impacts the hemodynamics in the LA. For this, the biomechanics of the LA, both from a structure and fluid point of view, will be characterized.
The internship project will focus on one of these aspects: the biomechanical response of atrial tissue.

Project summary: This project aims to characterize the biomechanical properties of human atrial appendage tissue. The mechanical response of tissues collected during surgery will be characterized via bi-axial tensile testing. MicroCT imaging of the samples will be performed and their segmentation will be used to build a numerical model of the biaxial tensile test. The prediction of the numerical model will be confronted to experimental data. This approach will help better understand the role of macro- and micro-structure on the mechanical behavior of atrial tissue.

Student profile: Background in Mechanical Engineering or Biomechanics, curiosity for medical applications. Interest in pursuing a PhD degree.

Administrative aspects: This internship is funded for 6 months, starting in the first trimester of 2027. A fully funded PhD position (mostly computational) will be opened on this research topic for a start in the Fall of 2027.

If you are interested, send a curriculum vitae and a short cover letter describing potential previous research experience and interests. Please, submit via email with “Atrial tissue internship” on the subject line to Fanette Chassagne, PhD (fanette.chassagne@emse.fr).