



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

**IMPLEMENTATION AND EVALUATION OF STEREO DIGITAL IMAGE CORRELATION FOR THE
CHARACTERIZATION OF BIOLOGICAL SOFT TISSUES**

Keywords: Digital image correlation, Soft tissues, Mechanical characterization,

Academic context: The research group at Mines Saint-Etienne leads major international research projects in the domain of soft tissue and fluid biomechanics in the cardiovascular system through a longstanding collaboration with the University Hospital in Saint-Etienne. Part of its work focuses on developing methods for the characterization of biological soft tissues mechanics, such as aortic or muscle tissue.

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. The main goal of this project is to investigate how changes in the LA's structure impact blood flows. To do this, we will study both the mechanical properties of the LA's wall and how blood flows through it. By understanding how these factors interact, we hope to gain insights into how changes in the LA's structure can cause problems with blood flow and potentially lead to complications. This research aims to contribute to the development of better diagnostic tools for atrial cardiomyopathy.

More specifically, this internship project will focus on one of the two aspects of the project: the characterization of the biomechanics of the LA wall.

Project summary: To characterize the mechanical response of the tissue, the group is currently developing a new bi-axial tension machine that will allow us to test multiple small samples from the same patient. To consider the heterogeneity of the tissue, local strains will be computed from stereo digital image correlation. The goal of the internship proposed here is to implement and evaluate the stereo digital image correlation setup.

The first step will be to test the optical set up on a synthetic material. In addition to the optical set up, several parameters related to the stereo DIC approach will be tested and evaluated, such as the speckle pattern or the post-processing approach. Finally, once the methods will be optimized, a detailed description of both the set up and the approach will be written for dissemination.

Student profile: Background in solid mechanics, physics or optics. Previous experience in experimental methods will be appreciated as well as curiosity for biomedical applications.

Administrative aspects: This internship is funded for 6 months, starting in the fall of 2023. The trainee will receive a stipend of 550 euros/month. The internship will be under the supervision of Baptiste Pierrat, Nicolas Curt and Fanette Chassagne.

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 "DIC internship" on the subject line to Baptiste Pierrat (pierrat@emse.fr), Nicolas Curt (curt@emse.fr) and Fanette Chassagne (fanette.chassagne@emse.fr).