

Geometric reconstruction with lacunary surface measure

Subject

In order to analyse shape variation of physical objects, such as pipes or mechanical pieces, it is required to modelled tracking methods suited for usable sensors. For instance, we may consider the deformation theory in continuum mechanic. In this specific application, strain jauges are simple to install and produce workable information.

During this internship, in order to understand the general problem and thus begin a theoretical study of shape variation, we will consider the following theoretical problem :

let $\Omega(t)$, a bounded open set of \mathbb{R}^3 with boundary $\Gamma(t)$, smooth (typically C^1) and $(\sigma_i(t))_{i \in \{1, \dots, p\}}$ a set of sub domains of $\Gamma(t)$ with Hausdorff measure equal to 1. At all time, we assume that the length of each element of $(\sigma_i(t))_{i \in \{1, \dots, p\}}$ known. What information can be retrieve from $\Omega(t)$.

The prerequisites for this internship are knowledge in analysis and geometry in order to understand shape modeling for one part and in optimisation and inverse problem to analyze the problem. The work will be divided in two parts : a theoretical study with well posed hypothesis that will allow for a first study of the problem, and then depending on the results, a demonstrator program will be implemented in Python.

Place of internship

The internship will take place in Laboratoire Jean Kuntzmann .

Contacts

Stéphane Labbé, stephane.labbe@univ-grenoble-alpes.fr

Christophe Picard, christophe.picard@univ-grenoble-alpes.fr