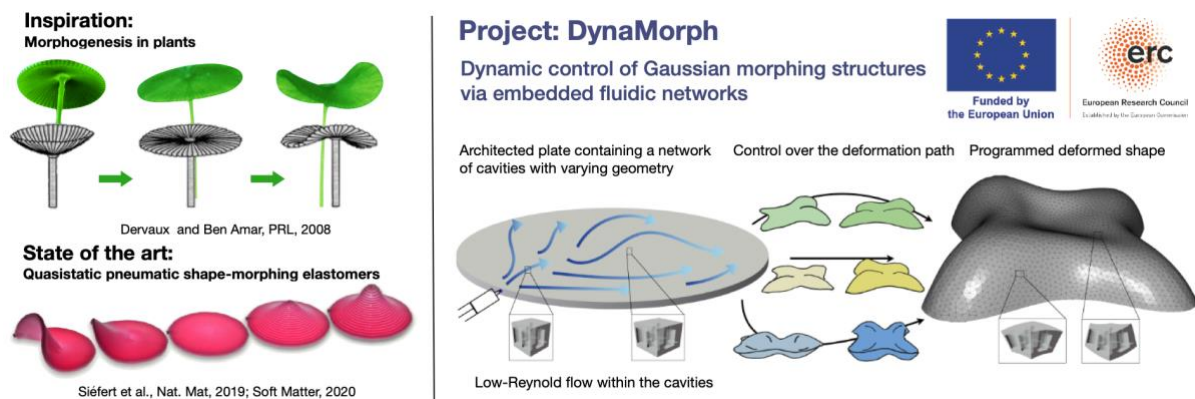


M2 internship - Dynamic shape-morphing control via fluid structure interaction.

In Nature, living materials are constantly evolving and adapting their shape to the environment, a feat that is lacking in engineered materials. To achieve this, differential growth within the tissues is key, as it induces mechanical stresses and thus the buckling in a rich variety of shapes. Over the last decade, emerging approaches have embraced this paradigm to develop bioinspired synthetic responsive materials (to external stimuli, such as, temperature, magnetic field, pressure) with in-plane distortions, and hence shape-morphing capabilities. However, despite rapid developments, current efforts primarily focus on programming the final equilibrium shape, overlooking both the dynamical trajectory of the transformation and the mechanics of the morphed structure. As a result, exciting biomedical applications perspective in minimally invasive surgery, rehabilitation and soft robotics remain so far beyond reach.



In this internship, you will develop 3D-printed soft architected structures containing a network of interconnected cavities. By controlling the flow and the pressure distribution within the soft architected structure, the aim will be to characterize and then rationalize the fluid structure interaction at play to program the shape changes in space and time.

This research project is at the crossroads between fluid mechanics, (slender) solid mechanics and biophysics. You will learn during this internship to use the toolbox of fast prototyping techniques (3D printing, molding, laser cutting, Arduino), data acquisition and image analysis techniques, and modelling of the observed phenomena. Depending on your interest, there is a possibility to develop fine-element numerical codes to simulate the actuation process.

The internship will take place at the Interdisciplinary Physics Laboratory (LIPhy), in Grenoble.

The internship can be followed by a PhD grant funded by the ERC Starting Grant DynaMorph.

Internship information:

Duration: 5-6 months

Grant: 600 euros per month

Degree: M2, Starting from February 2024.

Location: LIPhy, 140 rue de la Physique, 38400 Saint Martin d'Hères

Contact: [Emmanuel Siéfert](mailto:emmanuel.siefert@univ-grenoble-alpes.fr) (emmanuel.siefert@univ-grenoble-alpes.fr)

Feel free to contact me to discuss the project and the internship.