Modeling and simulation of an in vitro cadiac tissue assay

6 months internship proposal (starting sept. 2025)

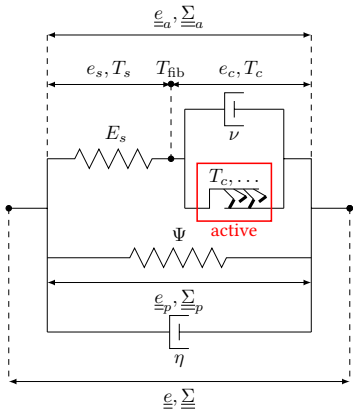

Figure 1: Mechanical model from Caruel et al. (2014)

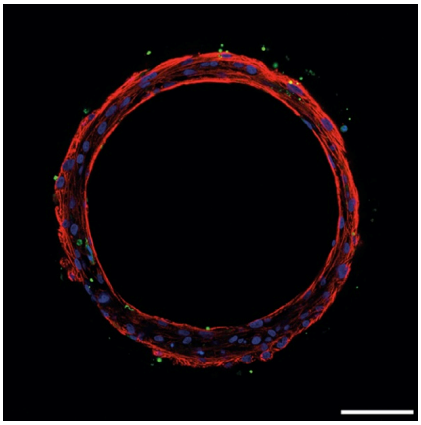

Figure 2: In vitro cardiac ring from Seguret et al. (2024)

Context and objective

The Biomechanics team at the MSME laboratory (Université Paris-Est Créteil) is developing a research partnership with the Paris Cardiovascular Research Center to create a mechanical model (Figure 1) of a high-throughput assay for testing the effects of drugs on cardiac tissue (Figure 2).

M. Caruel, the project leader in the Biomechanics group, is seeking a highly motivated student to contribute to the development, calibration, and validation of this model in close collaboration with members of PARCC.

The model is based on an existing formulation (Caruel et al. 2014), which will need to be adapted to the experimental setup and implemented numerically.
Available experimental data will be used for model calibration and validation.
The student may also participate in the experimental work.

The internship will be based at MSME in Créteil, with regular meetings at PARCC in Paris.

Profile

We are seeking a person with a strong academic background in solid mechanics, ideally with familiarity in large deformation theory. In addition, the recruit should have proven programming skills.

Contact

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References

Caruel, M., R. Chabiniok, P. Moireau, Y. Lecarpentier, and D. Chapelle. 2014. "Dimensional Reductions of a Cardiac Model for Effective Validation and Calibration." *Biomechanics and Modeling in Mechanobiology* 13 (4): 897–914. https://doi.org/gmtzn6.

Seguret, Magali, Patricia Davidson, Stijn Robben, Charlène Jouve, Celine Pereira, Quitterie Lelong, Lucille Deshayes, et al. 2024. "A Versatile High-Throughput Assay Based on 3D Ring-Shaped Cardiac Tissues Generated from Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes." Edited by Milica Radisic and Olujimi A Ajijola. *eLife* 12: RP87739. https://doi.org/10.7554/eLife.87739.