

Modeling and simulation of an in vitro cardiac tissue assay

6-month internship proposal (starting spring 2026)

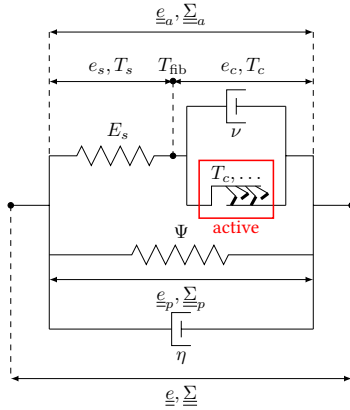


Figure 1: Mechanical model from Caruel et al. (2014)

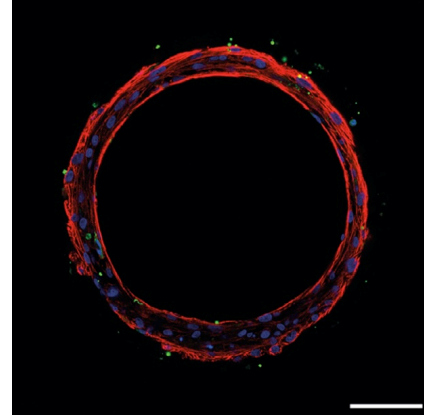


Figure 2: In vitro cardiac ring from Seguret et al. (2024)

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 numerical twin (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 numerical twin 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 conditions and implemented within an existing simulation framework. 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 for the numerical implementation of the model.

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/10/gmtzn6>.
- Seguret, Magali, Patricia Davidson, Stijn Robben, Charlene 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.” *eLife* 12: RP87739. <https://doi.org/10.7554/eLife.87739>.