UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Computational Biology and Complex Systems Research Group

Training Program in Computational Biophysics

TFG/TFM offer

Theory of embryonic tissue elongation

Animal shapes are highly diverse with organs of unique morphologies and functions. A fundamental event across vertebrate embryos is the generation of an animal body plan with a resulting coordinate system. **The embryonic tissues elongate along those axes to form the primordia such as the tail and limbs of the animal**. The mechanisms driving embryonic tissue elongation are unclear from a biophysical perspective. The goal of this project is to explore possible biophysical models of tissue elongation by combining agent-based simulations and continuum modelling in simplified geometries.

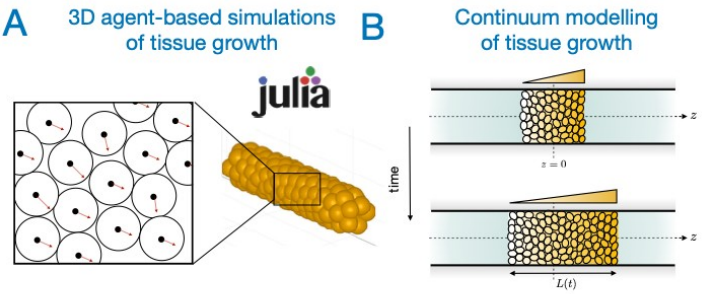

Fig. 1. A) 3D agent-based modelling of a growing tissue using notebook-based Julia programming. B) Continuum modelling of growing tissues using active hydrodynamic approaches.

Proposal

We propose a project to be conducted during the academic year 2023/2024. The main goal will be to simulate anisotropic growth of 3D tissues using an agent-based simulator and compare the results with simplified hydrodynamic models in 1D. Finally, if time allows the results will be compared to experimental data.

Supervisor: David Oriola (david.oriola@upc.edu) (UPC).

Candidate profile: Last course of Engineering Physics, Biosystems Engineering and/or Mathematics at Universitat Politècnica de Catalunya.

Centre: Escola Tècnica Superior d'Arquitectura de Barcelona (Barcelona).

Application: Sent CV (including grades) and a motivational letter to the head of the program Novemver 10th (Clara Prats, clara.prats@upc.edu).

Funding: Research group BIOCOM-SC will offer an INIREC contract to the three best candidates that want to carry out any of the project associated with this training program in *Computational Biophysics* in the academic year 2023/2024.