

PARTICLE-BASED MODELS IN CELL AND TISSUE MECHANOBIOLOGY

J.M. GARCÍA-AZNAR^{*}, JOSÉ J. MUÑOZ[†]
AND PAUL VAN LIEDEKERKE^{††}

^{*} Aragón Institute of Engineering Research (I3A), Universidad de Zaragoza
e-mail: jmgaraz@unizar.es - Web page: <https://m2be.unizar.es/people/jmgaraz/>

[†] Laboratori de Càlcul Numèric (LaCàN), Universitat Politècnica de Catalunya (UPC), Spain.
e-mail: j.munoz@upc.edu - Web page: <https://www.lacan.upc.edu/jose.munoz/>

^{††} Bionamix team, Faculty of Bioscience engineering, Ghent University, Belgium.
Email: Paul.VanLiedekerke@UGent.be - Web page: <https://bionamix.ugent.be/>

ABSTRACT

Vertex and particle-based computational models have become a valuable tool in mechanobiology for testing predictions, simulate responses, and infer non-measurable quantities. Nowadays, these computational methods help to answer open biological questions, and for this reason their accuracy and validation is of utmost importance.

This Invited Session aims to gather scientist and engineers that develop cell-based computational methods to simulate the mechanics of cells and tissues. These methods take into account the discrete nature of living matter, and may include:

- Particle cell-centred methods.
- Vertex methods.
- Hybrid particle-finite elements.
- Agent based methods.

Applications of different phenomena and at different scales are welcome. These may include for instance:

- Embryogenesis and organoid formation
- Cell and tissue mechanics and rheology.
- Phase transitions, fluidisation and softening.
- Cell migration, locomotion and spreading.
- Cell proliferation and cytokinesis.
- Pattern formation and cell sorting.