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COUPLED PROBLEMS IN ACTIVE AND LIVING MATTER

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ABSTRACT

Active and living matter is characterized by the tight coupling between chemical, electrical and mechanical processes in complex media where fluids, porous and transient networks, filaments, membranes, and other moving interfaces interact. These systems operate far-from-equilibrium, with chemical power input giving rise to emergent dynamical behaviours exploited by cells and tissues during development, physiology, which become disrupted during disease. Beyond biology, the understanding of these mechanisms can enable new bio-inspired technologies. This field greatly benefits from quantitative mathematical and computational modelling approaches, capable of formulating and solving efficiently the complex problems that describe active and living matter, which often involve multiphysics, multiscale, and bulk/interfacial aspects.

This symposium aims to bring together researchers interested in the active and living matter, embracing both fundamental and applied approaches. Contributions are welcome from experimental, theoretical, and computational perspectives addressing cellular and tissue mechanics, mechanobiology, and bioinspired systems.

Topics of interest include, but are not limited to:

- Multiscale and multiphysics modelling at sub-cellular, cellular, and multicellular scales across the tree of life.
- Experimental techniques for the multiphysics characterization of soft and biological tissues
- Integration between experiments and simulations
- Growth, remodeling, and aging of biological tissues
- Mechanics of bioinspired systems and soft robotics

- Pattern formation and active matter in biological and synthetic systems
- Mechanotransduction and cell-environment mechanical interactions
- Inverse design and reverse-engineering in biological and bio-inspired systems