ID de Contribution: **247**

Type: **Contribution orale**

Self-organized cable formation and force transmission in an active vertex model for epithelial tissues

mercredi 5 juillet 2023 14:45 (12 minutes)

Epithelial tissues play fundamental roles in living organisms. The mechanical behaviour of epithelial tissues involves interactions of many elements. Traditionally it is believed that genes and biochemistry instruct mechanics. Recently, it is becoming clear that mechanics also feeds back onto and drives gene expression and biochemical signalling, but how mechanical feedback affects tissue behaviour remains poorly understood.

One commonly used modelling approach, namely the vertex model, describes an epithelial monolayer as a network of active edges representing cell-cell boundaries. These edges actively contract and sustain tension, which is thus transmitted throughout the tissue. Inspired by experimental observations, we propose a dynamical vertex model combining passive edge viscoelasticity and active myosin motor activities. The model incorporates a known feedback loop in which edge tension regulates motor recruitment. Studying the emergent response of this type of tissue to external forces using both theory and computations, we show that in the presence of feedback, a tissue can become patterned with supracellular actomyosin cables consisting of chains of strongly contracting edges.

Our theory provides a potential explanation for the formation and refinement of actomyosin cables, which are ubiquitous in the development of organisms. From a physical point of view, the spontaneous contractile paths offer mechanisms for long-range force transmission, highlighting novel self-organized mechanical states in active tissues.

Affiliation de l'auteur principal

Laboratoire de Physique de l'Ecole Normale Supérieure

Auteurs principaux: QIU, Mingfeng (Laboratoire de Physique de l'Ecole Normale Supérieure); HAKIM, Vincent (Laboratoire de Physique de l'Ecole Normale Supérieure); CORSON, Francis (Laboratoire de Physique de l'Ecole Normale Supérieure)

Orateur: QIU, Mingfeng (Laboratoire de Physique de l'Ecole Normale Supérieure)

Classification de Session: Mini-colloques: MC04 Mécanique et le vivant

Classification de thématique: MC4 Mécanique et vivant