BALL STATE UNIVERSITY

The Mathematical Laws of Morphology and Biomechanics

PURDUE FORT WAYNE

Tuesday 27th September 2022 noon EDT

Virtual Presentation: https://purdue.webex.com/meet/aselvite

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Morpho-elasticity of thin living tissues: from leaves to epithelia

Thin structures are ubiquitous in life mostly in botanic (flowers, leaves) but not only. In mammals or insects, they concern epithelia or the couple epithelium-extracellular matrix joined in a thin bilayer. The complexity of finite-elasticity with growth is then simplified, the main task being the adaptation of elasticity to the geometry of the system under study. After a general presentation of morpho-elasticity based on examples, I will show than planar leaves select a growth kinematic that follows conformal mapping. For systems constrained externally, or presenting pre-stress, the Von-Karman equations with growth allow to recover the buckling of samples. As an illustration I will show the collapse of the imaginal disc of the drosophila wing for mutants. Finally if time allows, I will present the growing cysts of Pluripotent Stem cells.

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