Colloquium

How Do Biological Tissues Program Rigidity Transitions (and Can We Make Materials Do That, Too?)

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Host: Carl Goodrich

Multicellular organisms generate complex morphologies required for their function. Organisms control these morphologies by tuning active forces, and also by altering the emergent “material properties” of a tissue, i.e. the rheology of the tissue. In many cases, organisms take advantage of dramatic changes in the rheology that occur when the material undergoes a rigidity transition from a fluid-like or floppy state to a solid-like or rigid state, which in turn depends on internal parameters at the scale of cells and molecules. I will discuss recent work to understand the mechanisms that organisms use to control such transitions; some tissues alter their rheology via a first-order rigidity transition controlled by connectivity, while others utilize second-order rigidity controlled instead by the local cell or fiber geometry. Inspired by this second class of biological examples, I will also discuss some new approaches we have developed to design multifunctional mechanical metamaterials that can tune their rigidity while optimizing other desired properties

Monday, November 4, 2024 11:30am - 12:30pm
Raiffeisen Lecture Hall

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