McCormick

Northwestern Engineering

Engineering Sciences and Applied Mathematics

ESAM Seminar Series

The emergence of embryonic form

Presented by:

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The local rearrangement of cellular neighbours results in the alteration of tissue shape and the emergent changes in embryonic form - *morphogenesis*. Despite our molecular understanding of how the cytoskeleton generates active stresses we lack a *physical* mechanism responsible for the global rearrangements of cellular lattices, in particular the manifestly collective features of the dynamics. Relying on live fluorescent microscopy of *Drosophila* Germ Band Extension our work makes two key advances: 1) construction of an image-analysis tool that allows a non-destructive measurement of relative tissue stresses and 2) insight into the physics of epithelial tissues that reveals the importance of *shear* stresses between cellular neighbours. This key physical insight combined with our decidedly empirical approach allows construction of a simple mathematical model that reproduces many of the local and collective features observed in a wide array of different tissues and animals. More broadly speaking, my interests are in understanding the *emergence* of embryonic forms, and I believe constructing simple mathematical models that account for the interplay between the appropriate physics and biology is novel and can provide important insights.

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Technological Institute M416

For further information see http://www.esam.northwestern.edu

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