SCHOOL OF MECHANICAL & MATERIALS ENGINEERING

GRADUATE SEMINAR SERIES

An Averaged Continuum Model of Active Particle Systems

Presented by

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Abstract

Active materials consist of a liquid matrix and solid or soft matter inclusions capable of moving under their own power. Continuum modeling of such media is a subject of active research. Many competing theories exist but there is none that is universally accepted. In the talk we detail a method for deriving continuum balance equations of active materials from the meso-scopic stochastic ordinary differential equations (ODEs) known as Dissipative Particle Dynamics (DPD). The obtained continuum model generalizes the well known model of Toner and Tu. The equations are also stochastic, but become deterministic in the limit of infinite scale separation. The constitutive equations are derived from the DPD force equations. In particular, averaging of self-propulsion forces results in the typical ``flocking-promoting" term that has been included on ad hoc basis in many existing phenomenological theories.

Biography

Alexander Panchenko received Ph.D in Mathematics ins 2000 from the University of Delaware under the direction of Professor Robert Gilbert. He then held a postdoctoral position at Pennsylvania State University, and then was an Assistant Professor at the New Mexico Institute of Mining and Technology. Since 2003, he has been working at the Washington State University Math Department

where he is currently a Professor of Mathematics. His research interests are Partial Differential Equations of continuum mechanics, homogenization, inverse problems, averaging of ODE systems, and recently data analysis and feature extraction from very small and very large sampled data sets.

Thursday, April 11th, 2019
11:00am to Noon
ETRL room 101

Meet the speaker before the seminar in ETRL room 119, 10:30am to 10:50am. Light refreshments will be served.

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The complete schedule of the MME Seminar Series can be found at https://mme.wsu.edu/events/.