PURDUE FLUIDS SEMINAR SERIES

NETWORK MODELING OF FLUID FLOW THROUGH MEMBRANES

FRIDAY FEBRUARY 27TH, 2026
SEMINAR 1:30PM-2:30PM WALC 2007
DISCUSSION 2:30PM-3:30PM WALC 2007

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Abstract
Fluid flow through porous media is a complex problem, especially when the medium itself changes, as is often the case in many applications. Commonly used simplifications model the medium as a network of interconnected pores; while this idea is not new, innovative approaches enable efficient simulations that compute flow through thousands of networks with modest computing resources. These simulations enable ensemble averaging and the identification of statistical features of the results, exposing the variability based on pore and network structure. The final part of the presentation will focus on topological data analysis (TDA), which offers a deeper understanding of the factors that influence flow. While the discussion will mainly address filtration, we will also briefly touch on other physical setups where similar TDA-based methods provide valuable insights.

Biography
Lou Kondic is an applied mathematician who has worked for over 30 years on a variety of problems in materials science, including granular matter, porous media flows, dynamics of Newtonian and non-Newtonian thin films, and bubble dynamics in the context of sonoluminescence. Lately, his main interests have focused on the use of topological methods to quantify, describe, and understand a variety of materials science systems. After completing his PhD in Physics at CCNY of the City University of New York, he carried out postdoctoral research at the Courant Institute at NYU and the Physics and Mathematics Departments at Duke University, before joining NJIT, where he now holds the title of Distinguished Professor. He is a Fellow of the American Physical Society with the quote 'For understanding of complex fluid dynamics, from thin films to granular flows'.

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