Colloquium

Partial differential equations and scaling limits

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Partial differential equations (PDEs) are a fundamental tool for modeling in the sciences, providing accurate descriptions for many phenomena from the molecular scale over the scale of continuum mechanics to the largest scales in the universe. The rigorous justification of scaling limits is an important aspect of modern mathematical PDE theory: In many situations, it is desirable to replace a rather complex (and sometimes intractable) PDE model by approximating it by a simpler equation. For other PDE models, it may be necessary to regularize the PDE for the purpose of numerical simulation, and it remains to be shown that the solution to the regularized problem is close to the original one.In this talk, we focus on two particular examples of scaling limits for PDEs. In the first part, we discuss the derivation of effective macroscopic equations for media with random small-scale structure, along with corresponding numerical approaches. In the second part of the talk, we outline a recent approach to the analysis of stability and approximability of curvature-driven flows.

Monday, May 31, 2021 04:00pm - 05:00pm
Online

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