Multidisciplinary **S**imulation, **E**stimation, and **A**ssimilation **S**ystems
Seminar Series

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Stirring, Mixing and Lagrangian Coherence --- From Mathematics to Applications

Abstract: When milk in a cup of coffee or plankton in the ocean are stirred, we observe organizing patterns --- such as vortices and filaments --- form due to the fluid motion. It is well accepted that irreversible mixing arising from small-scale processes are enhanced by large-scale stirring, yet we are still striving to quantitatively relate small-scale mixing to large-scale motion through parameterizations, or even fundamentally understanding what we should parameterize against. For example, shear is really induced by the relative motion of nearby fluid trajectories, and thus it is natural to describe the flow by negotiation between neighboring trajectories, or by the Lagrangian perspective. In this talk, I'll discuss the mathematics behind Lagrangian diagnostics, their applications and perspectives on where we are heading. Among other things, I'll discuss my current work using Lagrangian Coherent Structures in understanding reactions in a nonlinear background flow.

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Massachusetts Institute of Technology
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