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An effective diffusivity model based on Koopman mode decomposition HASSAN ARBABI, IGOR MEZIC, UC Santa Barbara — In the previous work, we had shown that the Koopman mode decomposition (KMD) can be used to analyze mixing of passive tracers in time-dependent flows. In this talk, we discuss the extension of this type of analysis to the case of advection-diffusion transport for passive scalar fields. Application of KMD to flows with complex time-dependence yields a decomposition of the flow into mean, periodic and chaotic components. We briefly discuss the computation of these components using a combination of harmonic averaging and Discrete Fourier Transform. We propose a new effective diffusivity model in which the advection is dominated by mean and periodic components whereas the effect of chaotic motion is absorbed into an effective diffusivity tensor. The performance of this model is investigated in the case of lid-driven cavity flow.

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