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On the relationship between stretching and homogenization in chaotic Stokes flows MOHSEN GHEISARIEHA, MARK STREMLER, Virginia Tech — It is well known that chaotic particle trajectories can be generated in laminar flows by deterministic, time-periodic velocity fields. The exponential stretching of material lines in these flows can be quantified using the 'topological entropy'. This measure of chaos is useful because in some circumstances it can be predicted mathematically using very limited information about the flow. We consider the relationship between this stretching and the mixing produced in these flows, which we evaluate by considering homogenization of a passive scalar. We study two different time-dependent, two-dimensional Stokes flow systems as examples: a double-lid-driven cavity flow and a 3-rod stirring system in a cylindrical domain. We will discuss the correspondence between topological entropy and decay in the variance of scalar concentration for varying parameters in these flows.

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