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Topological entropy calculation in 2D fluid flows using limited-time tracer particles[1] XIAOLONG CHEN, KEVIN MITCHELL, University of California, Merced, SPENCER SMITH, Mt. Holyoke College — Topological entropy quantifies the complexity of 2D chaotic flows by measuring the stretching rate of a material curve. This quantity can be estimated by the trajectories of an ensemble of passive tracers, such as beads. Previous work has required these trajectories to persist for the full duration of experimental interest. However, it is common in experimentally tracked data for trajectories to begin and end at different times, either because trajectories have moved out of the focal plane, left the image domain, or have simply not been tracked properly from frame to frame. In this talk, we extend our previous method—the ensemble-based topological entropy calculation (E-tec)—to accommodate such limited-time trajectories. Through numerical simulation, we show that one can still compute an accurate topological entropy even when no single trajectory persists for the full duration of the time interval of interest.

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