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Characterizing changes in topological entropy via break up of almost-invariant sets PIYUSH GROVER, Mitsubishi Electric Research Laboratories, MARK STREMLER, SHANE ROSS, PANKAJ KUMAR, Virginia Tech — In certain two-dimensional time-dependent flows, the braiding of periodic orbits provides a way to analyze chaos in the system through application of the Thurston-Nielsen classification theorem (TNCT). We build upon our earlier work that showed the first application of the TNCT to braiding of almost-invariant sets (AIS). AIS in a fluid flow are regions with high local residence time that can act as stirrers or 'ghost rods'. In the present work, we discuss the break up of the AIS as a parameter value is changed, which results in a sequence of topologically distinct braids. We show that, for Stokes' flow in a lid-driven cavity, these various braids give good lower bounds on the topological entropy over the respective parameter regimes. Hence we make the case that a topological analysis based on spatio-temporal braiding of almost-invariant sets can be used for analyzing chaos in fluid flows.

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