Abstract Submitted
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Lagrangian Coherent Structures separate dynamically distinct regions[1] DOUGLAS KELLEY, Department of Materials Science & Engineering, Massachusetts Institute of Technology, MICHAEL ALLSHOUSE, Department of Mechanical Engineering, Massachusetts Institute of Technology, NICHOLAS OUELLETTE, Department of Mechanical Engineering & Materials Science, Yale University — Lagrangian Coherent Structures (LCS) are special material lines that play a role in unsteady flow analogous to the stable and unstable manifolds of hyperbolic fixed points in periodic flows. Since they are material lines, fluid elements cannot cross them, and thus they separate regions of the flow field that are kinematically distinct. Using recently developed filter-space techniques that allow us to localize spectral transport processes in space, we study the Lagrangian averages of scale-to-scale energy transfer in an experimental quasi-two-dimensional flow. We find that, surprisingly, LCS appear to divide regions that are dynamically as well as kinematically distinct. We find that on the average LCS separate parts of the flow field with coherent (in a Lagrangian sense) scale-to-scale energy fluxes in different directions.

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