Abstract Submitted
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The topological features of a fully developed turbulent wake flow.[1]
HUIXUAN WU, University of Kansas — The persistent homology method is used to study the behavior of a turbulent wake field in the phase space. The phase space is constructed using the velocities at 1024 points, and the flow evolution is represented by a trajectory in this space. The trajectory contains many recurrences. The recurrence pattern reflects the interactions among turbulent eddies. Every recurrent section is considered as an interrogation unit. The number of self-crossings in each recurrent loop, which is measured by the first Betti number, reflects the temporal complexity. A significant amount of trajectories have just a few self-crossings, and a small number of complex trajectories contain more than 100 self-crossings. In summary, the homology of recurrent trajectories can be used to characterize a turbulent flow. How to imply higher order Betti numbers needs to be investigated in the future.

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