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The Effect of Phase Averaging Techniques on Lagrangian Coherent Structures in the Wake of a Circular Cylinder[1] MATTHEW ROCKWOOD, MELISSA GREEN, Syracuse University — Experimental results of the wake of a circular cylinder were studied using Lagrangian coherent structures (LCS). The planar velocity data was collected at multiple Reynolds numbers over a range from 3,000 to 12,000 using a two-component DPIV measurement system. The data was phase averaged by binning velocity fields based on two reference quantities: vorticity centroid location in each snapshot, and pressure measurements on the cylinder surface. A Proper Orthogonal Decomposition (POD) was also applied to the velocity data to extract portions of the velocity field containing the most energy. Another set of phase averaged velocity fields were then generated using the vorticity centroid location of the POD reconstructed fields. The change in the LCS locations and the vortices identified using the Eulerian Q-criterion were found to be minimal. This investigation ensures that the most accurate, efficient phase averaging techniques are being used to study the LCS in the wake of the circular cylinder.

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