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Uncertainty Quantification from Measures of Divergence in 2D PIV Data ASHLEY MONTALVO, ETHAN CULLER, JOHN FARNSWORTH, Univ of Colorado - Boulder — Particle image velocimetry (PIV) is subject to various sources of uncertainty that can lead to erroneous velocities in the derived vector fields. In recent years, significant effort has been focused on developing methods to quantify this uncertainty. In general, these methods calculate uncertainty from the raw PIV images and the quality of the cross correlation. This project has been initiated to develop a method for quantitative data quality assessment using vector fields alone. This approach utilizes the fact that for incompressible flows, erroneous vectors will result in non-zero divergence. The presented work focuses on quantifying the relationship between uncertainty and divergence. Planar PIV measurements were taken in the wake of a NACA 0015 airfoil at four angles of attack and uncertainty was calculated using the correlation statistics method implemented in the LaVision DaVis software. Correlations were then made between the divergence and uncertainty fields through methods of cross-correlation and covariance. A correlation of approximately 50 percent was found for the raw fields; however, this value is sensitive to data filtering and noise floor levels.

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