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Uncertainty Quantification and Statistical Convergence Guidelines for PIV Data MATTHEW STEGMEIR, DAN KASSEN, TSI Inc — As Particle Image Velocimetry has continued to mature, it has developed into a robust and flexible technique for velocimetry used by expert and non-expert users. While historical estimates of PIV accuracy have typically relied heavily on "rules of thumb" and analysis of idealized synthetic images, recently increased emphasis has been placed on better quantifying real-world PIV measurement uncertainty. Multiple techniques have been developed to provide per-vector instantaneous uncertainty estimates for PIV measurements. Often real-world experimental conditions introduce complications in collecting "optimal" data, and the effect of these conditions is important to consider when planning an experimental campaign. The current work utilizes the results of PIV Uncertainty Quantification techniques to develop a framework for PIV users to utilize estimated PIV confidence intervals to compute reliable data convergence criteria for optimal sampling of flow statistics. Results are compared using experimental and synthetic data, and recommended guidelines and procedures leveraging estimated PIV confidence intervals for efficient sampling for converged statistics are provided.

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