

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Benchmark measurements for evaluation of PIV uncertainty method STAMATIOS POTHOS, TSI Inc., SAYANTAN BHATTACHARYA, PAVLOS VLACHOS, Purdue Univ, DAN TROOLIN, WING LAI, TSI Inc. — PIV combines a series of instruments, algorithms and user inputs in order to quantify the displacement of flow tracer patterns in complex flows. Each of these components is bound to introduce uncertainty in the resulting measurement, and often these uncertainties are coupled or difficult to estimate. Recent developments have now presented a series of methods for quantification of uncertainty in planar PIV measurements, however each of these methods appears to offer different advantages or disadvantages and their strengths and weaknesses are not well understood. Moreover, there is a need for extensive testing of these methods against a variety of real experimental data and flow conditions. In this work we execute a benchmark experiment of a flow over a cylinder using time resolved PIV with simultaneous LDV measurements to serve as a comparison benchmark, and we use these data to compare the different uncertainty quantification methods and assess their reliability. The presented comparisons will include signal to noise ratio methods, image disparity methods and correlation plane statistics and the estimated uncertainties will be assessed using error probability distributions, time series analysis, and coverage factors.

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Date submitted: 01 Aug 2014

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