

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

An experimental database for evaluating PIV uncertainty quantification methods SCOTT WARNER, Utah State University, DOUGLAS NEAL, LaVision Inc., ANDREA SCIACCHITANO, a.sciacchitano@tudelft.nl — Uncertainty quantification for particle image velocimetry (PIV) data has recently become a topic of great interest as shown by the publishing of several different methods within the past few years. A unique experiment has been designed to test the efficacy of PIV uncertainty methods, using a rectangular jet as the flow field. The novel aspect of the experimental setup consists of simultaneous measurements by means of two different time-resolved PIV systems and a hot-wire anemometer (HWA). The first PIV system, called the “PIV-Measurement” system, collects the data for which uncertainty is to be evaluated. It is based on a single camera and features a dynamic velocity range (DVR) representative of many PIV experiments. The second PIV system, called the “PIV-HDR” (high dynamic range) system, has a significantly higher DVR obtained with a higher digital imaging resolution. The hot-wire was placed in close proximity to the PIV measurement domain. All three of the measurement systems were carefully set to simultaneously collect time-resolved data on a point-by-point basis. The HWA validates the PIV-HDR system as the reference velocity so that it can be used to evaluate the instantaneous error in the PIV-measurement system.

Douglas Neal
LaVision Inc.

Date submitted: 01 Aug 2014

Electronic form version 1.4