

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Daylight Operable PIV for Use in the Field LARRY BROCK, JIAN SHENG, Texas Tech Univ — Particle Image Velocimetry (PIV) is widely used in laboratory scale studies, however, has considerable difficulties for application in the field. The issue mainly arise due to the presence of background sunlight and undesirable environmental conditions. To overcome the strong ambient light during the double exposure PIV operation, one must reduce substantially the total ambient illuminations to the tracer particle scattering. To achieve the above mentioned objective, we increase the scattering by using a pulsed laser with short pulse width ($<7\text{ns}$) at the same time shortening the image exposure. The laser light is introduced via fiber optic cable where the laser is located in a remote location and delivered to the encapsulated pod to form a thin collimated $50 \times 1\text{mm}$ sheet, latter being the thickness. The sheet is then reflected between a series of mirrors to create a light-in-flight. The light sheet is overlapped slightly between the reflections and illuminates the entire field of view in the time of camera exposure (e.g. $1\mu\text{s}$). The DOPIV system is capable of measuring 2D velocity in a $.5 \text{ m} \times .5 \text{ m}$ field of view with 0.2 mm spatial resolution and 7.6 mm vector spacing. The bench-top and fields experiments are performed to demonstrate the feasibility of the systems in understanding near surface transport phenomenon such as wake in a wind farm, atmospheric/oceanic boundary layer, etc.

Larry Brock
Texas Tech Univ

Date submitted: 01 Aug 2015

Electronic form version 1.4