

Abstract Submitted
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Compact 3D Camera for Shake-the-Box Particle Tracking CHRISTINA HESSELING, DIRK MICHAELIS, LaVision GmbH, Anna-Vandenhoeck-Ring 19, D-37081 Goettingen, Germany, JAN SCHNEIDERS, Delft University of Technology, Faculty of Aerospace Engineering, Kluyverweg 1, 2629 HS Delft, Netherlands — Time-resolved 3D-particle tracking usually requires the time-consuming optical setup and calibration of 3 to 4 cameras. Here, a compact four-camera housing has been developed. The performance of the system using Shake-the-Box processing (Schanz et al. 2016) is characterized. It is shown that the stereo-base is large enough for sensible 3D velocity measurements. Results from successful experiments in water flows using LED illumination are presented. For large-scale wind tunnel measurements, an even more compact version of the system is mounted on a robotic arm. Once calibrated for a specific measurement volume, the necessity for recalibration is eliminated even when the system moves around. Co-axial illumination is provided through an optical fiber in the middle of the housing, illuminating the full measurement volume from one viewing direction. Helium-filled soap bubbles are used to ensure sufficient particle image intensity. This way, the measurement probe can be moved around complex 3D-objects. By automatic scanning and stitching of recorded particle tracks, the detailed time-averaged flow field of a full volume of cubic meters in size is recorded and processed. Results from an experiment at TU-Delft of the flow field around a cyclist are shown.

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