

Abstract Submitted
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3D Rainbow Particle Tracking Velocimetry. ANDRES A. AGUIRRE-PABLO, JINHUI XIONG, RAMZI IDOUGHI, ABDULRAHMAN B. ALJEDAANI, XIONG DUN, QIANG FU, SIGURDUR T. THORODDSEN, WOLFGANG HEIDRICH, King Abdullah Univ of Sci Tech (KAUST) — A single color camera is used to reconstruct a 3D-3C velocity flow field. The camera is used to record the 2D (X,Y) position and colored scattered light intensity (Z) from white polyethylene tracer particles in a flow. The main advantage of using a color camera is the capability of combining different intensity levels for each color channel to obtain more depth levels [1]. The illumination system consists of an LCD projector placed perpendicularly to the camera. Different intensity colored level gradients are projected onto the particles to encode the depth position (Z) information of each particle, benefiting from the possibility of varying the color profiles and projected frequencies up to 60 Hz. Chromatic aberrations and distortions are estimated and corrected using a 3D laser engraved calibration target. The camera-projector system characterization is presented considering size and depth position of the particles. The use of these components reduces dramatically the cost and complexity of traditional 3D-PTV systems. [1] Xiong, J., Idoughi, R., Aguirre-Pablo, A.A., Aljedaani, A. B., Dun, X., Fu, Q., Thoroddsen, S. T., Heidrich, W. “Rainbow Particle Imaging Velocimetry for Dense 3D Fluid Velocity Imaging.” ACM Trans. Graph. 36, 4, Article 36 (2017).

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