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Development of a 3D Digital Particle Image Thermometry and Velocimetry (3DDPITV) System[1] DAVID SCHMITT, GREG RIXON, DANA DABIRI, University of Washington — A novel 3D Digital Particle Image Thermometry and Velocimetry (3DDPITV) system has been designed and fabricated. By combining 3D Digital Particle Image Velocimetry (3DDPIV) and Digital Particle Image Thermometry (DPIT) into one system, this technique provides simultaneous temperature and velocity data in a volume of $\sim$1x1x0.5 in^3 using temperature sensitive liquid crystal particles as flow sensors. Two high-intensity xenon flashlamps were used as illumination sources. The imaging system consists of six CCD cameras, three allocated for measuring velocity, based on particle motion, and three for measuring temperature, based on particle color. The cameras were optically aligned using a precision grid and high-resolution translation stages. Temperature calibration was then performed using a precision thermometer and a temperature-controlled bath. Results from proof-of-concept experiments will be presented and discussed.

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