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Development of a Flexible Four-Camera Volumetric PIV System for Tow Tank Applications RUBEN HORTENSIUS, STAMATIOS POTHOS, MARK CECCONI, TSI Incorporated — Traditionally PIV experimentation for hydrodynamic, marine, and biological applications, have been carried out in water tunnel facilities, where the instrumentation is safely located outside of the facility. Due to practical constraints, this has often resulted in limited ability to conduct experiments at large scale or at high magnifications. To overcome this, submersible PIV systems have been developed, allowing for PIV experimentation in facilities such as towing tanks. These tow tank PIV systems, whether 2D/planar-PIV or 3D/stereo-PIV, are still regarded as very unique and highly specialized, in no small part due to the exceptionally distinctive facilities which house them. TSI has provided numerous PIV systems for underwater applications in the past, and in 2017 produced a specialized system capable of being used for 2D/planar measurements, 3D/stereoscopic measurements, and 3D3C volumetric measurements. Details of the capabilities of the new system are described, as well as insights gleaned from the design, manufacture, and installation of this one-of-a-kind system. Preliminary volumetric PIV results obtained with the system are shared and discussed.

Ruth Teferi
APS

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