

Abstract Submitted
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3D Particle Tracking Velocimetry Method for Lagrangian Measurement of Underwater Vortex Rings K.F. WASHINGTON, F.J. DIEZ, Rutgers, The State University of New Jersey — Vortex Rings generated by an underwater speaker were studied using volumetric 3D Particle Tracking Velocimetry. Instantaneous visualization of the full structure of vortices can be difficult to obtain, but could give valuable insight into the behavior of unsteady vortices. Typically, measurements of an entire volume are difficult to obtain, and more often measurements at specific points or planes are obtained instead. In this study, the structure of vortices at various instances in time was obtained using a volumetric particle tracking velocimetry (PTV) method. The observation volume had dimensions of 40mm x 40mm x 40mm and a low density particle seeding of approximately 75 particles/cm³ was used. Four cameras were used to obtain all the information required to track the position of the seeding particles in the observed volume. The images from the four cameras were analyzed by a 3D PTV algorithm obtained through a collaboration with the group of Dr. Kinzelbach at the Swiss Federal Institute of Technology. Using this method, the three components of the velocity for each particle could be tracked as a function of time and used to aid in both the visualization and characterization of the 3D behavior of unsteady vortical flows. The 3D vortical structures were generated by an underwater speaker fitted with a converging nozzle. The system was operated at frequencies between 1-100Hz and was optimized for maximum thrust.

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