Abstract Submitted for the DFD06 Meeting of The American Physical Society

Double-plane stereo-PIV study on Tornado-like vortex in water¹ TOSHIHIDE HANARI, JUN SAKAKIBARA, Department of Engineering Mechanics and Energy, University of Tsukuba — We investigated tornado-like vortex induced by a fan similar to Rushton turbine placed under the top surface of a cylindrical water tank. The three-component velocity fields in a cross-section of the tornado-like vortex were measured by stereoscopic PIV. Swirling flow was formed in the tank, and an upward flow was confirmed near the center of vortex. While the vortex core was dominated by an upward flow, abrupt velocity deficit at the center of vortex was observed in the mean axial velocity profile. Temporal fluctuation of the axial velocity indicated the existence of the instantaneous downward flow in the vortex core. By using double laser light sheet stereo-PIV method, axial gradient of vorticity will be investigated to evaluate the fluctuating pressure gradient in the vortex core inducing the axial velocity fluctuation.

¹Supported by Environmental Measurement Services, Inc., Japan.

Jun Sakakibara Department of Engineering Mechanics and Energy, University of Tsukuba

Date submitted: 05 Aug 2006

Electronic form version 1.4