

Abstract Submitted  
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**Swirl ratio effects on tornado-like vortices** POOYAN HASHEMI-TARI, The Boundary Layer Wind Tunnel Laboratory, University of Western Ontario, ROI GURKA, University of Western Ontario, HORIA HANGEN, The Boundary Layer Wind Tunnel Laboratory, University of Western Ontario — The effect of swirl ratio on the flow field for a tornado-like vortex simulator (TVS) is investigated. Different swirl ratios are obtained by changing the geometry and tangential velocity which determine the vortex evolution. Flow visualizations, surface pressure and Particle Image Velocimetry (PIV) measurements are performed in a small TVS for swirl ratios  $S$  between 0 and 1. The PIV data was acquired for two orthogonal planes: normal and parallel to the solid boundary at several height locations. The ratio between the angular momentum and the radial momentum which characterize the swirl ratio is investigated. Statistical analysis to the turbulent field is performed by mean and rms profiles of the velocity, stresses and vorticity are presented. A Proper Orthogonal Decomposition (POD) is performed on the vorticity field. The results are used to: (i) provide a relation between these 3 sets of qualitative and quantitative measurements and the swirl ratio in an attempt to relate the fluid dynamics parameters to the forensic, Fujita scale, and (ii) understand the spatio-temporal distribution of the most energetic POD modes in a tornado-like vortex.

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