Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Spreading and decay of axisymmetric drag wakes: experiment D. CURTIS SAUNDERS, SCOTT WUNSCH, Johns Hopkins University — The spreading and decay of drag wakes is of interest to a wide variety of applications in geophysics and engineering, such as the wakes of mountains, seamounts, wind-farms, and buildings. For axisymmetric bodies, the classical self-similar scaling law formulated by Swain (1929) has long been widely accepted (Tennekes and Lumley 72) and used to describe the wakes of spheres (Bevilaqua and Lykoudis 78) and slender bodies (Pao and Lin 73). However, results from recent experiments have cast doubt on the classical decay law (Bonnier and Eiff 02; Nedic. Vassilicos, and Ganapathisubramani 13), indicating more rapid wake spreading and decay than the classical result. Here, new laboratory data from a dimpled sphere are presented. The Reynolds number (50,000) exceeds previous experiments, and the dimples alleviate issues with Strouhal vortex shedding. Particle Imaging Velocimetry (PIV) data in both along-track and cross-track configurations are used to illustrate various aspects of the wake decay. The observed wake decays at a greater rate than suggested by the classical result, and extends the self-similar decay to further downstream distances than previously reported.

D. Curtis Saunders
Johns Hopkins

Date submitted: 30 Jul 2019 Electronic form version 1.4