Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Anomalous vortex shedding and wake profiles in quasi-two-dimensional flows PAUL W. FONTANA, DOMINIC A. DAMS, Seattle University — Vortex shedding by circular cylinders in a vertical soap film channel exhibits anomalously low shedding frequencies compared with observations in conventional systems. Furthermore, the Strouhal number ($\mathrm{St} = fD/U_\infty$, where f is the shedding frequency, D the cylinder diameter, and U_∞ the upstream flow speed) is not uniquely determined by the Reynolds number ($\mathrm{Re} = DU_\infty/\nu$, where ν is the kinematic viscosity). We have previously argued that Ekman friction is a likely cause [*Bull. Amer. Phys. Soc.* **57**(17), R10.7]. Other possibilities include gravity, which in this system acts as a forcing mechanism not typically present during vortex shedding measurements, surface tension effects, or variable-viscosity effects due to variations in film thickness. Theory to predict the shedding frequency is lacking and so it is unclear if or how each of these mechanisms should affect it, but understanding the anomaly may elucidate the shedding process. We present two-dimensional profiles of velocity, viscosity, and surface friction measured in the wake of the cylinder under several sets of flow parameters and discuss their implications for the various candidates. The results do not support variable viscosity as a cause.

Paul Fontana
Seattle University

Date submitted: 01 Aug 2014 Electronic form version 1.4