Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Free-stream shear effects on vortex shedding from step-cylinders.[1] WARREN DUNN, STAVROS TAVOULARIS, University of Ottawa — In a recent experimental study we examined the complex process of vortex shedding from cylinders with a stepwise change in diameter inserted in uniform streams. The present work examines vortex shedding from a step-cylinder with a diameter ratio near 2 in uniformly sheared flow generated by a curved screen in a water channel. The Reynolds number, based on the centreline velocity and the large cylinder diameter, was in the range 268 to 622. The experimental techniques include laser Doppler velocimetry and flow visualization by electrolytic precipitation. Compared to the uniform flow case, vortices in the shear flow were generally less well-defined. In both the uniform and shear flows, spectra identified spanwise cells of constant frequency, including a distinct cell near the step, but the number of cells was larger in the shear flow case. The orientation of the cylinder axis relative to the shear direction affected the spanwise length of the near-step cell, the frequency difference between this cell and the adjacent cell behind the large cylinder, and the inclination of vortices behind both cylinders. Wavelet analysis showed that the vortex shedding frequency changed constantly with time near cell boundaries and within the near-step cell.

[1]Supported by the Natural Sciences and Engineering Research Council of Canada

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Date submitted: 18 Jul 2005 Electronic form version 1.4