

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Surface Ripples Generated in a Couette Flow with a Free Surface¹

N. MASNADI, N. WASHUTA, J.H. DUNCAN, University of Maryland — Free surface ripples created by subsurface turbulence in the gap between a vertical surface-piercing moving wall and a parallel fixed wall are studied experimentally. The moving wall is created with the aide of a meter-wide stainless steel belt that travels horizontally in a loop around two rollers with vertically oriented axes, which are separated by 7.5 meters. One of the two 7.5-m-long belt sections between the rollers is in contact with the water in a large open-surface water tank and forms the moving wall. The fixed wall is an acrylic plate located 4 cm from the belt surface. The water surface ripples are measured in a plane normal to the belt using a cinematic LIF technique. Measurements are done at a location about 100 gap widths downstream of the leading edge of the fixed plate in order to have a fully developed flow condition. It is found that the overall RMS surface fluctuations increase linearly with belt speed. The frequency-domain spectra of the surface height fluctuation and its temporal derivative are computed at locations across the gap width and are used to explore the physics of the free surface motions.

¹The support of the Office of Naval Research is gratefully acknowledged.

James Duncan
University of Maryland

Date submitted: 01 Aug 2014

Electronic form version 1.4