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Water Surface Ripples Generated by the Turbulent Boundary Layer of a Surface-Piercing Moving Wall[1] N. WASHUTA, N. MASNADI, J.H. DUNCAN, University of Maryland — Free surface ripples created by subsurface turbulence along a surface-piercing moving wall are studied experimentally. In this experiment, a meter-wide stainless steel belt 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 the water level is adjusted so that the top of the belt pierces the water free surface. The belt is launched from rest with a $3g$ acceleration in order to quickly reach a steady state velocity. This belt motion creates a temporally evolving boundary layer analogous to the spatially evolving boundary layer created along the side of a ship hull moving at the belt velocity, with a length equivalent to the length of belt that has passed the measurement region. The water surface ripples generated by the subsurface turbulence are measured in a plane normal to the belt using a cinematic LIF technique. It is found that the overall RMS surface fluctuations increase linearly with belt speed and that the spatial distributions of the fluctuations show a sharp increase near the wall.

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