Abstract Submitted
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Wind shear induced wave-turbulence interaction in quiescent water in presence of flexible protruding obstacles TIRTHA BANERJEE, Nicholas School of the Environment, Duke University, MARIAN MUSTE, IIHR, Department of Civil Engineering, University of Iowa, GABY KATUL, Nicholas School of the Environment, Duke University — PIV experiments involving air-water and flexible oscillating components have been conducted and a spectral analysis framework regarding data analysis involving noise, wave and turbulence separation has been presented. The experiments reveal that wave and turbulence effects are simultaneously produced at the air-water interface and the nature of their coexistence is found to vary between different flow parameters including water level, mean wind speed, obstacle density and flexibility. For deep water levels, signature of fine-scaled inertial turbulence is found at deeper layers of the water system. The wave action appears stronger close to the air-water interface and damped by the turbulence deeper inside the water system. As expected, wave action is found to be dominated in a certain frequency range driven by the wind forcing, while it is also diffused to lower frequencies by means of (wind-induced) oscillations of the obstacles. Existence of a counter-current flow and its switching to fully forward flow in the direction of the wind under certain combinations of flow parameters has also been observed. The relative importance of wave and turbulence to the overall energy, degree of anisotropy in the turbulent energy components, and momentum transport mechanisms are also quantified.

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