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Wall shear stress fluctuations induced by shallow-water Langmuir turbulence BINGQING DENG, ANQING XUAN, LIAN SHEN, University of Minnesota — In shallow water with the existence of surface waves, large-scale full-depth Langmuir circulations can be generated due to the interaction between wind-driven currents and the Stokes drift of shallow-water waves. We perform wall-resolved LES of the Craik-Leibovich equation to study shallow-water Langmuir turbulence. It is found that the full-depth Langmuir circulations directly leave large-scale footprint near the water bottom and hence have significant contributions to the wall shear stress fluctuations. The full-depth Langmuir circulations also alter the distribution of other coherent structures, so that the distribution of the wall shear stress fluctuations contributed by other coherent structures is different from the wall turbulence in the absence of Stokes drift of surface waves. The magnitude of the wall shear stress fluctuations at various locations is predicted by the velocity fluctuations induced by the full-depth Langmuir circulations.

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