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A K-profile parameterization of Langmuir turbulence in shallow water NITYANAND SINHA, ANDRES E. TEJADA-MARTINEZ, University of South Florida, CHESTER E. GROSCH, GUILLAUME MARTINAT, Old Dominion University — Langmuir turbulence in shallow water is often characterized by full-depth Langmuir circulation (lc) generated by the interaction between the wind-driven shear current and the stokes drift velocity induced by surface gravity waves. Large-eddy simulations (LES) of full-depth LC in a wind-driven shear current have revealed that mixing due to LC erodes the bottom log-law velocity profile inducing a profile resembling a wake law. Meanwhile, near the surface, stokes drift shear serves intensify small scale eddies leading enhanced mixing and disruption of the surface log-law. A k-profile parameterization (KPP) comprised of local and nonlocal components is introduced capturing these basic mechanisms by which full-depth LC and associated turbulence impact the mean flow. Single water column Reynolds-averaged Navier-Stokes (RANS) simulations with the new parameterization are presented showing good agreement with les in terms of mean velocity profiles.

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