

Abstract Submitted
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A terrain-following modeling of wave boundary layers¹ JIE YU,
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put forward a terrain-following modeling approach for Stokes boundary layer flows.
This complements the recent new development of the exact Floquet theory of water
waves, that gives a complete basis of solutions for time harmonic potential flows
over an arbitrarily periodic seabed. The theory applies for any given frequency,
including the resonant waves. For a non-steep seabed profile, but not necessarily
small undulation height comparing with the water depth, the analytical solutions can
be obtained for the boundary layer velocities, bed shear stresses and rate of viscous
dissipation, explicitly showing the variations both across the boundary layer and
along the bed. For a relatively steep bed profile, a remedy is proposed that allows
the velocity profiles to be locally determined across the boundary layer avoiding
solving the 2-D differential equation for the vorticity. The modeling methodology is
presented here for a constant viscosity, including the case of constant eddy viscosity,
but can be extended to the case of variable eddy viscosity to improve turbulence
modeling.

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