Abstract Submitted
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Vorticity-based correction for modelling of free-surface wave interacting with turbulent current WEI ZHANG, Research Fellow — This paper describes a new vorticity-based correction model for studying the interaction between free-surface wave and turbulent current. To track free-surface movements, the volume of fluid (VOF) method is employed. The momentum equations are rewritten to avoid the numerically generated vorticity effects along the air-water interface. Simultaneously unsteady RANS equations are used, while standard k-epsilon model is adapted with modification to the production term by introducing the vorticity to limit the production of turbulent kinematic energy at free surface. To validate the numerical model used here, standalone wave and current cases are studied to ensure the accuracy of each component of the numerical model. The model is then used to simulate the interaction between the second-order stokes wave and turbulent current for both wave following and countering in a setting of shallow water wave flume. The results are compared with experimental measurement available in the literature.

Wei Zhang
Research Fellow

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