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On the extension of the Wave Action Equation for higher order depth and current effects

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A new form of the Wave Action Equation on the basis of the EMSE (Extended Mild Slope Equation), which is suitable for engineering applications (Liau et al. 2011), will be introduced

The new form of the Wave Action Equation accounts for higher order depth effects and ambient current effects. The modified equation has been introduced into the Wind Wave Model II (Roland 2009, Hsu et al. 2005). We show results using the new model for investigations of cases, where wave transformation in a strong shear current occurs or higher order bottom effects influences the wave evolution. The results showed the improvement of the solution due to the modifications we made. The investigations show clearly that the extension made to the original WAE improve the accuracy of model in such environments.

Furthermore, we give an outlook on the derivation of the time depended wave action equation that accounts for the effect's of the currents on the Doppler shift while retaining a linear dispersion relation. The derivation time depended mild slope equation that was re-derived in order to include higher order current effects on the wave propagation. The final result is a new WAE with an "effective" intrinsic frequency and wave number that differ from the ones of the wave ray theory (Toledo et al. 2011).

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