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Mixing induced by ISWs breaking over a sloping boundary: an analytical heuristic model

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We propose an analytical approach to estimate mixing efficiency in Internal Solitary Waves (ISWs) breaking processes. We make use of the theoretical framework of Winters et al. [1995] to describe the energetics of a stratified fluid flow, calculating the Available Potential Energy (APE) of an ISW of depression in a two-layer system, assuming that the symmetric density structure on both sides of the feature is exactly the same. Starting from the definition of mixing efficiency given by Michallet and Ivey [1999], through the Ozmidov and Thorpe length-scales we derive an expression for the mixing efficiency avoiding the use of any wave model (as KdV-type models or strongly nonlinear models) to estimate the wave energy. The model is successfully verified through laboratory experiments performed in a wave tank and is meant to be applied by using real field CTD casts.

References:

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