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The Nonlinear Equatorial Kelvin Wave

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ABSTRACT

Using the method of strained coordinates, a uniformly valid approximation to the nonlinear equatorial Kelvin wave is derived. It is shown that nonlinear effects are negligible for the Kelvin waves associated with the Gulf of Guinea upwelling. The Kelvin waves involved in El Niño, however, are significantly distorted both in shape and speed. The leading edge is smoothed and expanded rather than steepened, but the trailing edge will form sharp fronts and eventually break.

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