

The effect of rotation on internal solitary waves

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Abstract:

Internal solitary waves are commonly observed in the coastal oceans and in the lower atmospheric boundary layer. They are often modeled by nonlinear wave equations of the Korteweg-de Vries type, which are well-known to support exact solitary wave solutions. However, they are observed to survive for long periods, and hence it is necessary to examine the effect of the earth's rotation on their long-time evolution. In this case, the relevant nonlinear wave equations can no longer support exact solitary wave solutions, and instead an initial solitary-like disturbance decays into radiating inertia-gravity waves. In this talk, we will demonstrate through a combination of theoretical analyses, numerical simulations and laboratory experiments that the long-time outcome of this radiation is a wave packet, whose carrier wavenumber is determined by an extremum in the group velocity.