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The effect of rotation on nonlinear stratified flow over topography[1] T.R. AKYLAS, ALI TABAEI, MIT — Steady, two-dimensional, rotating, stratified flow of large depth over topography is considered for the case of uniform flow speed and buoyancy frequency far upstream. Under these flow conditions, if rotation is not present, the nonlinear response due to finite-amplitude topography can be found analytically via Long's model. It turns out that rotation behaves as singular perturbation as it always becomes important in the far field, and we examine its effect on Long's nonlinear flow state by a matched-asymptotics procedure in the weak-rotation limit (large Rossby number). It is found that nonlinear interactions over the topography induce propagating gravity-inertial waves that alter the nature of the response far downstream. Representative streamline patterns are shown, and the implications for unsteady flow computations are discussed.

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