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**Internal Wave Transmission Across the Equatorial Undercurrent**
JOSHUA NAULT, BRUCE R. SUTHERLAND, University of Alberta — We examine the propagation of internal waves from the surface mixed region of the equatorial Pacific Ocean through the equatorial undercurrent. Thus we are able to assess the spectrum of waves capable of penetrating to the deep ocean and energising the deep equatorial countercurrents. We show that heuristics based on ray theory are not sufficient to make this assessment. A numerical code is developed to solve the Taylor-Goldstein equation for arbitrary buoyancy frequency and background flow profiles. In addition to numerical integration of the governing equation, the code also uses a initial condition driver that finds a unique causal wave-like solution and thus determines the transmitted and reflected wave amplitudes. From these we determine the transmission coefficient defined to be the ratio of transmitted to incident pseudoenergy. Using equatorial ocean density and background flow speed observations, we develop characteristic analytic basic state profiles. Applying the code, the transmission coefficient is calculated for given incident initial internal wave frequencies $\omega$ and horizontal wavenumbers $k$. For a range of $\omega$ and $k$ for which waves do not encounter a critical level and the Doppler-shifted frequency is less than the local buoyancy frequency at all depths (and hence for waves that one might expect on the basis of ray theory to transmit perfectly) we find wave transmission is largest for incident waves that are close to being harmonic with vertical modes in the duct.

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