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Internal Wave Transmission Across Critical Levels GEOFF L. BROWN, BRUCE R. SUTHERLAND, University of Alberta — We study the transmission of internal gravity waves through non-uniformly stratified fluid with vertically varying background shear. The appropriate value for the transmission coefficient in this case is the ratio of the flux of transmitted to incident pseudoenergy. We derive an analytic prediction for the transmission coefficient of waves incident upon a piecewise-linear shear flow in which the fluid is unstratified over the depth of the shear and is uniformly stratified above and below the shear-layer. Such a basic state is unstable but with vanishingly small growth rate as the bulk Richardson number becomes larger. In the limit of infinitely large Richardson number (no shear), we recover the tunnelling prediction of Sutherland & Yewchuk (JFM, 2004). In weak shear, there is no transmission if the phase speed of the incident waves matches the speed of the flow on the other flank of the shear layer, but weak transmission can occur otherwise, even if the phase speed of the waves matches the speed of flow within the shear layer. In strong shear, a transmission peak occurs where the wavenumber and frequency of the incident waves is close to the wavenumber and frequency associated with the most unstable mode and, hence, with overreflected waves.

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