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# Energetics of high frequency gravity waves generated during adjustment to localized forcing of a stratified shear flow

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The energetics of high frequency gravity and acoustic waves generated by localized, time-dependent forcing of a nonisothermal and sheared atmosphere is investigated. The evolution and structure of total energy perturbations linearized about an arbitrary hydrostatic and geostrophic basic state is comprised of normal and nonnormal contributions. The normal contribution is determined by the stratification of the basic state which yields an orthogonal set of basis functions describing the vertical structure. In the presence of a shear, the non-normal time-dependent amplitude of these orthogonal modes exhibits growth and decay via intermodal interactions. The analysis of the total perturbation energy presents an alternative to using the Taylor-Goldstein equation that can be used to construct the fully time-dependent solution for arbitrary nonhomogeneous forcing. Several examples of the wave response following a midtropospheric heating are presented for basic states having shear and nonconstant stratification.