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Convectively and Orographically Forced Mesoscale Flows in a Stably Stratified Atmosphere JAEMYEONG MANGO SEO, JONG-JIN BAIK, Seoul Natl Univ — Mesoscale flows forced by convective-orographic forcing in a stably stratified atmosphere are theoretically examined. We consider a two-dimensional, steady-state, hydrostatic, nonrotating linear system satisfying the Boussinesq approximation with convective elevated thermal forcing and mountain mechanical forcing. Solutions for perturbation horizontal and vertical velocities are obtained by analytically solving the equation system. Flows forced by thermal forcing linearly affect flows forced by orographic forcing, and vice versa. Convectively forced flows are affected by the maximum height and half-width of a mountain and its relative location to the thermal forcing. Orographically forced updrafts (downdrafts) strengthen (weaken) the convective system. In a stably stratified atmosphere, both thermal forcing and orographic forcing generate vertically propagating internal gravity waves. The vertical flux of the horizontal momentum is obtained analytically. In the total momentum flux, nonlinear interaction terms between convectively and orographically forced components are contained. The effects of the nonlinear interaction terms on the total momentum flux are examined with different values of the parameters related to orographic forcing.

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