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Analysis of linear stability for katabatic slope flows subject to ambient winds[1] CHENGNIAN XIAO, INANC SENOCAK, University of Pittsburgh — In the original Prandtl model, the slope flows are purely gravity driven due to thermal forcing imposed at the surface. The extended Prandtl model incorporates the presence of ambient winds to better approximate nocturnal flows profiles in sloped terrain or over (Ant-)arctic ice sheets than does the original model. In an effort to establish the set of dimensionless numbers governing the slope flows, we investigate the linear stability of such generalized slope flows with the help of modal analysis and direct numerical simulations for a range of slope angles. In order to fully describe the stability behavior of slope flows subject to ambient winds, we introduce a new dimensionless number in addition to the recently introduced stratification perturbation parameter. This new dimensionless number is a measure of the relative importance of the inertia of ambient winds with respect to total damping effects in the background medium. The effect of ambient winds measured by this new parameter on the stability behavior of the extended Prandtl slope flow configuration will be investigated, and major differences to the basic Prandtl model will be highlighted

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