Abstract Submitted
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Turbulent flows over a modeled steep topography in a thermally-stratified boundary layer. WEI ZHANG, Mechanical Engineering, Cleveland State University, COREY MARKFORT, Civil and Environmental Engineering, University of Iowa, FERNANDO PORTÉ-AGEL, École polytechnique fédérale de Lausanne, Switzerland — Turbulent flows with features of separation and reattachment, induced by topography of steep slopes, have been very challenging to predict using numerical models. The geometry of the topography, surface roughness and temperature along with the inflow characteristics (velocity, turbulence level, and atmospheric thermal stability) play important roles in determining onset of separation, reattachment location and momentum and heat flux distribution. To address the coupled effects of steep slope and thermal stability on turbulent flows over topography, series of wind-tunnel measurements of velocity fields, temperature and heat fluxes will be presented. Results will demonstrate the turbulent flow properties, including the size of the separation bubble, separated shear layers and the boundary layer recovery in different cases. Focus will be placed on correlation of momentum and heat flux distribution in the wake and turbulent kinetic energy transport.

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