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Thermally driven upslope flow in mountainous terrain DAN LIBERZON, CHRISTOPHER HOCUT, HARINDRA J. FERNANDO, Civil Engineering and Geological Sciences University of Notre Dame, Notre Dame, IN 46556, ENVIRONMENTAL FLUID DYNAMICS TEAM — Buoyancy driven up-slope flow and its separation from mountain apex are two important processes that determine meso and regional flows in mountainous areas. Such flow configurations have applications from mountain meteorology to large scale monsoonal circulation. A combined experimental and theoretical study toward improving our understanding of the mechanisms governing upslope flow processes, in particular, generation of upstream circulating cells and plume rise at the apex is presented. The experiments were performed in a 1.25x.35x.3 m water tank, using an inclined (10 to 30 degrees from the horizontal) electrical foil as the heated slope. Under certain condition the flow configuration produced stable circulation cells and rising limited plumes of finite height. Particle Tracking Velocimetry and flow visualization techniques were used for the diagnostics of velocity field and plume rise height, and relevant salient dimensionless quantities were evaluated in terms of governing parameters. Theoretical arguments are presented to explain the results. Parameter ranges for the appearance of characteristic flow patterns are also delineated.

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