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**Mixing and Displacement Buoyancy-Driven Exchange Flow Between Adjacent Zones** SALEH NABI, Mitsubishi Electric Research Laboratories, MORRIS FLYNN, University of Alberta — Buoyancy driven flow between two finite zones containing fluid of slightly different density is investigated. The two zones are separated by either a single common doorway or top and bottom vents. In the former case, a two-layer exchange flow develops once the barrier is removed. A buoyant plume of light fluid mixes with the dense fluid leading, over time, to the development of non-trivial ambient density stratification. Meanwhile, a gravity current propagates into the light zone, which upon reflection and reaching the doorway in a form of an internal bore, alters the dynamics of the exchange flow. The exchange flow is also significantly altered if and when the first front in the dense zone falls below the top of the doorway, in which case an intermediate layer develops in the light zone. Conversely, when the two zones are separated by top and bottom vents, two oppositely directed exchange flows are generated. The transient evolution of the interface, stratification and buoyancy in each zone are estimated both for the case where the light zone does and does not contain a source of buoyancy. Similitude experiments help to identify the limitations of the analytical models for each scenario.

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