Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Natural ventilation of interconnected boxes MORRIS R. FLYNN, Mech. & Aero. Eng., UCSD, COLM P. CAULFIELD, BPI & DAMTP, University of Cambridge — We examine the natural ventilation flow which occurs when a source of buoyancy is confined within a forced room with three vents: one low level exterior vent; and high and low level vents to an unforced room, which in turn has a high level exterior vent. This generalizes toward more realistic building planforms the classic single room flow considered by Linden et al. (1990). The steady state flow in the forced room is very similar to the single room case, with a well-mixed buoyant layer whose relative depth is determined purely by the vent geometry. However, it is essential to consider the system's time history to identify even the steady state properties of the flow in the unforced room. The development of a vertically stratified buoyant layer in the unforced room is inevitable; its depth depends in a non-trivial way on the cross-sectional areas of not only all the vents, but also the two rooms. We compare the predictions of a hierarchy of numerical models with the results of analogue laboratory experiments, demonstrating the critical role played by the developing vertical stratification in the unforced room.

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Date submitted: 10 Aug 2005 Electronic form version 1.4