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Time-dependent dynamics of fluid temperature driven by a constant temperature vertical wall in an insulated space RACHAEL BONNEBAIGT, DAMTP, University of Cambridge, C.P. CAULFIELD, BP Institute & DAMTP, University of Cambridge, P.F. LINDEN, DAMTP, University of Cambridge — We consider the time-dependent flow induced by heating at a vertical wall, held at constant temperature, in a sealed insulated box. Conservation of volume flux, momentum flux, and buoyancy flux give equations for the plume that rises up the wall and for return flow in the ambient fluid. We solve these equations numerically with three different assumptions: a) plume fluid spreading at the ceiling mixes "perfectly" throughout the box down to a first front, leading to two-layer stratification; b) plume fluid spreads at the ceiling with 'zero' mixing into the evolving ambient fluid, leading to continuous ambient stratification; c) the heat transfer coefficient at the wall varies with height according to the classical model of F. J. Bayley (1955 *Proc. I. M. E.* **169** 361-370), i.e. that the Nusselt number is proportional to the one third power of an appropriate Rayleigh number. All schemes reach the same final state: the box reaches the wall temperature and the plume shuts down. We compare the three predictions for the time-dependent ambient temperature distribution with analogue laboratory experiments.

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