Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Measuring the mixing in two-layer exchange flow ROSS GRIFFITHS, TJIPTO PRASTOWO, GRAHAM HUGHES, ANDY HOGG, Research School of Earth Sciences, The Australian National University — We have measured the rates of mixing in two-layer, density-driven exchange flows through a constriction. Laboratory experiments utilised two long reservoirs of fresh and salty water separated by a contraction. The shear between the two counter-flowing layers in the contraction generates stratified turbulence and localized mixing. We focus on the amount of mixing and its influence on the mass fluxes. A mixing efficiency is defined as the difference between the measured decrease of potential energy and the decrease expected if there were no mixing, normalized by the expected potential energy decrease with no mixing. Over a period of steady mean flow before gravity currents reach the end walls of the reservoirs, the efficiency is found to be 11% ($\pm$ 1%) for most of the conditions investigated. Smaller efficiencies are found for very small density differences, where the mixing is intermittent. The mass exchange flux is found to be a constant fraction (82% $\pm$2%) of the predicted maximum in the (non-turbulent, steady, inviscid) hydraulically controlled solution.

Ross Griffiths
The Australian National University

Date submitted: 12 Aug 2005 Electronic form version 1.4