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Self-consistent definition for the variable depth of unsteady, turbulent gravity currents HAFIZ JUNAID ANJUM, JIM MCELWAINE, DAMTP, University of Cambridge, C.P. CAULFIELD, BPI and DAMTP, University of Cambridge — We used the data from two-dimensional direct numerical simulations of Boussinesq gravity currents to define a self-consistent depth, h, and reduced gravity, $g' = \frac{g}{\rho_0}(\rho - \rho_0)$, for the current in terms of moments of the current density field. We demonstrate that using these definitions to calculate the Froude number, Fr=$u/\sqrt{g'h}$, gives a constant Froude number in constant-velocity and self-similar regime. At sufficiently high Reynolds number, our results are consistent with previous experimental and theoretical models (Shin *et al.* 2004, Nokes *et al.* 2008). We also develop a simple model to quantify the loss of mass from the gravity current head due to shear-induced vortices which propagate away from and behind the head.

Shin, J. O., Dalziel, S. B., Linden, P. F. (2004). Gravity currents produced by lock exchange. *J. Fluid Mech.* **521**,1-34.
Nokes, R.I., Davidson, M.J., Stepien, C.A., Veale, W. B., Oliver, R.L. (2008). The front condition for intrusive gravity currents. *J. Hydraul. Res.* **46** (6) 788-801.

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