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CORRIGENDUM

Transition stages of Rayleigh–Taylor instability between miscible fluids

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A missing factor of 2 in the scaled diffusivity, used to evaluate $\sigma(k)$ from the Rayleigh–Taylor linear-stability theory for viscous and diffusive fluids of Duff, Harlow & Hirt (1962), led to an incorrect plot of this curve in figure 2. The corrected curve is plotted in figure 1, below, as a dimensionless product, $\sigma(k)\,\tau$, where $\tau = \sqrt{L/(\mathscr{A}g)}$ is the characteristic time (6*c*). The error led to an incorrect inference regarding the agreement of the relative times for the A, B, and C cases when mixing-zone growth emerges from its diffusion-dominated, $h \propto t^{1/2}$ regime to the subsequent, faster-growth regime, with h the Rayleigh–Taylor mixing-zone height. The relative values of these times (figure 8) are then in qualitative accord with linear theory. This is despite the fact that the initial perturbation amplitudes are moderate (21) and may place even early-time growth outside the applicability of linear theory.

Additionally, the 1/3 factor in the Neumann pressure boundary condition (17) is erroneous. The correct boundary condition is

$$\frac{\partial p}{\partial z} = \frac{1}{Re}\frac{\partial^2 w}{\partial z^2} - \rho,$$

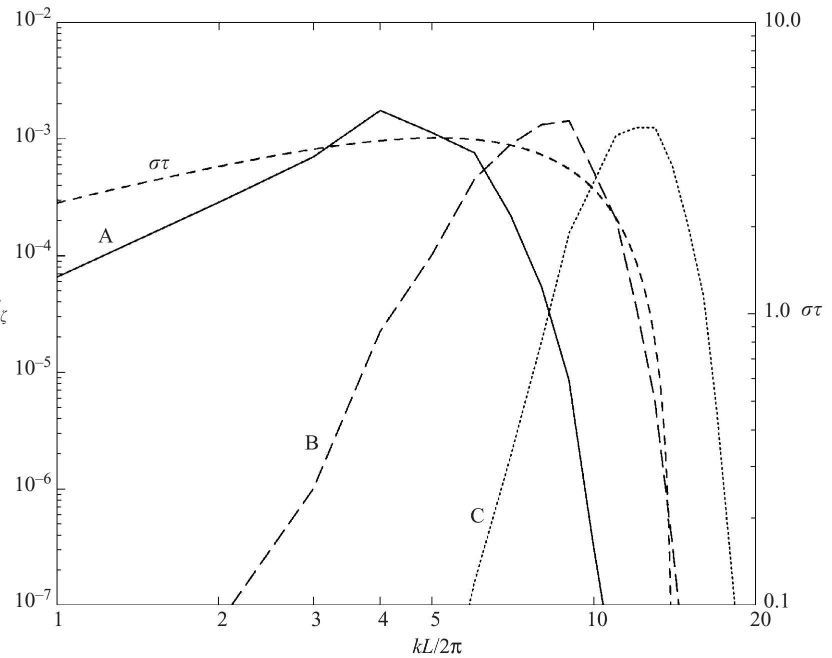

Figure 1. Spectra (left axis) of initial interfacial perturbations (18) for Cases A, B, and C. The scaled exponential-growth coefficient (right axis), $\sigma(k)\tau$, is computed from the linear-stability theory of Duff *et al.* (1962).

prior to the arrival of mixed fluid at the endwalls, when $\nabla\rho = 0$ and therefore also (equation (15))

$$\nabla \cdot \boldsymbol{u} = -\frac{1}{Pe}\nabla \cdot \left(\frac{1}{\rho}\nabla\rho\right) = 0,$$

at the endwalls. In separate simulations, by T. W. Mattner, with large bubbles/spikes and at a lower *Re*, the difference in mixing-zone behaviour caused by the effectively lower-viscosity boundary condition was confirmed to be negligible. This is as expected in view of the higher *Re* in the original DNS runs and their termination some time prior to the arrival of mixed fluid at the endwalls.

We regret the two errors and are grateful to S. J. Chapman for the analysis of the linear stability estimates that led to the discovery of the missing factor of 2. We are also grateful to T. W. Mattner for bringing the erroneous factor of $1/3$ in the boundary condition to our attention and for running the test simulations to verify that the difference had a negligible effect on the original results.

REFERENCES

Duff, R. E., Harlow, F. H. & Hirt, C. W. 1962 Effects of diffusion on interface instability between gases. *Phys. Fluids* **5**, 417–425.