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CORRIGENDUM

Direct simulation of the stably stratified turbulent Ekman layer

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A programming error, which had the effect of introducing a heat sink into the flow, was discovered. The flow description given in §2 is therefore not consistent with the equations actually solved. Equation (3) (p. 679) should be replaced by

$$\partial \Phi / \partial t + \nabla \cdot (\boldsymbol{u} \Phi) = \kappa \nabla^2 \Phi - H,$$

where the heat sink is $H = \mathscr{H} \exp(-z/c_*)$, with $c_* = 3.3D$, and $\mathscr{H} = 1.3 \times 10^{-6} G/D = 2.6 \times 10^{-4} f$ for Cases SA and NSA. For Cases SB, SC and SD, $\mathscr{H}$ is 0.50, 0.075 and 0.15 times the Case SA value, respectively. Since the sink is well defined and appears only in the mean temperature equation, the results in the paper can be viewed as a valid (but different) representation of the stably stratified turbulent Ekman layer. Readers attempting to duplicate the results must include H in the analysis.

To determine the importance of the sink term we recomputed Runs SA and NSA (which had the strongest sinks) with $H = 0$. Because it is small where the Richardson number is non-zero, the sink has only a slight influence on the turbulence. Consequently, the differences were found to be statistically unimportant – apart from those associated with the altered slope of the mean temperature near the surface:

(1) The surface heat flux, shown in figure 2(*a*) (p. 686), increases. Ri_0 is about 15% larger at $tf = 0.95$ in both Cases SA and NSA. In Case SA the difference then grows until, at $tf = 3.9$, Ri_0 is about 55% higher than before, whereas for Case NSA for $tf > 3$ the difference between the $H = 0$ and $H \neq 0$ Ri_0 histories changes sign and becomes indistinguishable from statistical oscillations. Thus, rather than reducing the surface flux by one-third to one-half, the stable buoyancy diminishes it by only about one-quarter (p. 688).

(2) The time-averaged Oboukhov length is reduced, so that L_*/δ changes from 10.1 to 7.3, h/L_* from 0.06 to 0.08, and $h(|f|/u_* L_*)^{\frac{1}{2}}$ from 0.18 to 0.21 (table 3, p. 693).

(3) Much closer agreement (within about 15%) of the three r.m.s. temperature fluctuation profiles in the surface-flux scaling given in figure 10 (p. 698), is obtained. The time-averaged maximum (near $z/z_{\max} = 0.2$) also decreases from about 5.3 to approximately 3.5, a value that is within 10% of the maximum of about 3.8 found when the figure 10 data are rescaled by the time-averaged $H = 0$ surface flux.

(4) The magnitude of the (surface-flux normalized) heat-flux profiles in figure 11(*a*) (p. 698) is reduced; the minima of all three curves are now above -1. Instead of both falling to the left of the time-averaged profile, the $tf = 0.95$ curve falls to the left, and the $tf = 3.9$ curve to the right. The new time-averaged profile again gives $h = 0.30 z_{\max}$ (p. 694) but the location of the time-averaged minimum shifts from $z \approx 0.08 z_{\max}$ to near $0.06 z_{\max}$ and its value increases from about -0.88 to -0.67. This new minimum is also within 10% (compared to -0.62) of the $H \neq 0$ result when it is rescaled by the time-averaged $H = 0$ surface flux.