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On the decay of stratified wake: A numerical study KARU CHONGSIRIPINYO, SUTANU SARKAR, UC, San Diego — In stratified fluids, wakes are longer lived with a significant reduction of mean velocity defect. G.R. Spedding (1997) and K.A. Brucker S. Sarkar (2010) quantify decay rates in 3 phases, namely a near-wake (NW), a non-equilibrium (NEQ), and a quasi-two-dimensional (Q2D) region. Given $U_0 \propto x^{-m}$, where U_0 is centerline mean defect velocity and m is a decay rate, both studies observe $m_{NW} \approx 2/3$, $m_{NEQ} \approx 1/4$, and $m_{Q2D} \approx 3/4$. Here, U_∞, D, and N are the free-stream velocity, length scale of a wake generator, and constant background buoyancy frequency, respectively. However, M. Bonnier and O. Eiff (2002) observe $m_{NEQ} = 0.38$ in their experiment and K. Chongsiripinyo and S. Sarkar (TSFP10) find $m_{NEQ} \simeq 0.4$ in their simulation. In the far wake, M. Bonnier and O. Eiff (2002) obtain $m_{Q2D} = 0.9$ close to the value of $m = 0.88$ from Spedding *et al.* (1996) at similar flow conditions. Due to the lack of consistency, more evidence is required. The present study utilizes advantages of both body-inclusive (BI) and temporal-model (TF) simulations to not only resolve near-body statistics, but also to reduce computational expense needed. Decay rates of mean velocity defect and turbulence dissipation will be presented.

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