4.1) Given a flow in the bottom boundary layer of the ocean, assuming that the flow profile is well described by a log-layer calculate the bottom stress, given that the flow measured 3 m above the bottom is 0.10 m s\(^{-1}\) and a ‘bottom roughness’ \(z_0=0.001\) m.

4.2) Describe the different flow conditions for a negative Richardson number, for a small, but positive Richardson number (say, below 0.25), and a large, positive Richardson number. Where might you find each kind of condition?

4.3) Reynolds average the temperature equation, where \(T = \langle T \rangle + T'\), and the velocities are decomposed in a similar way (as done in class for the momentum equation). Identify the terms for molecular diffusion of temperature and turbulent diffusion of temperature.

4.4) In a typed paragraph, describe how the eddy mixing length hypothesis relates the size and velocity perturbations carried by large, turbulent eddies to the turbulent viscosity of water.