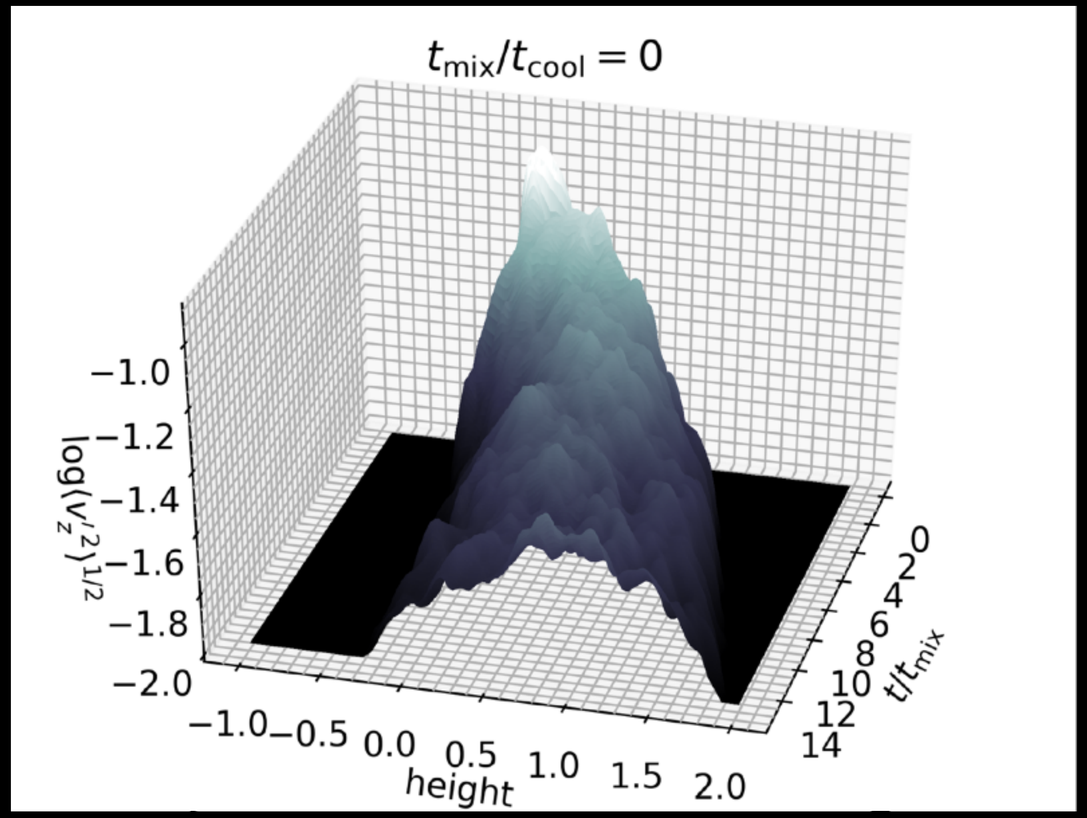
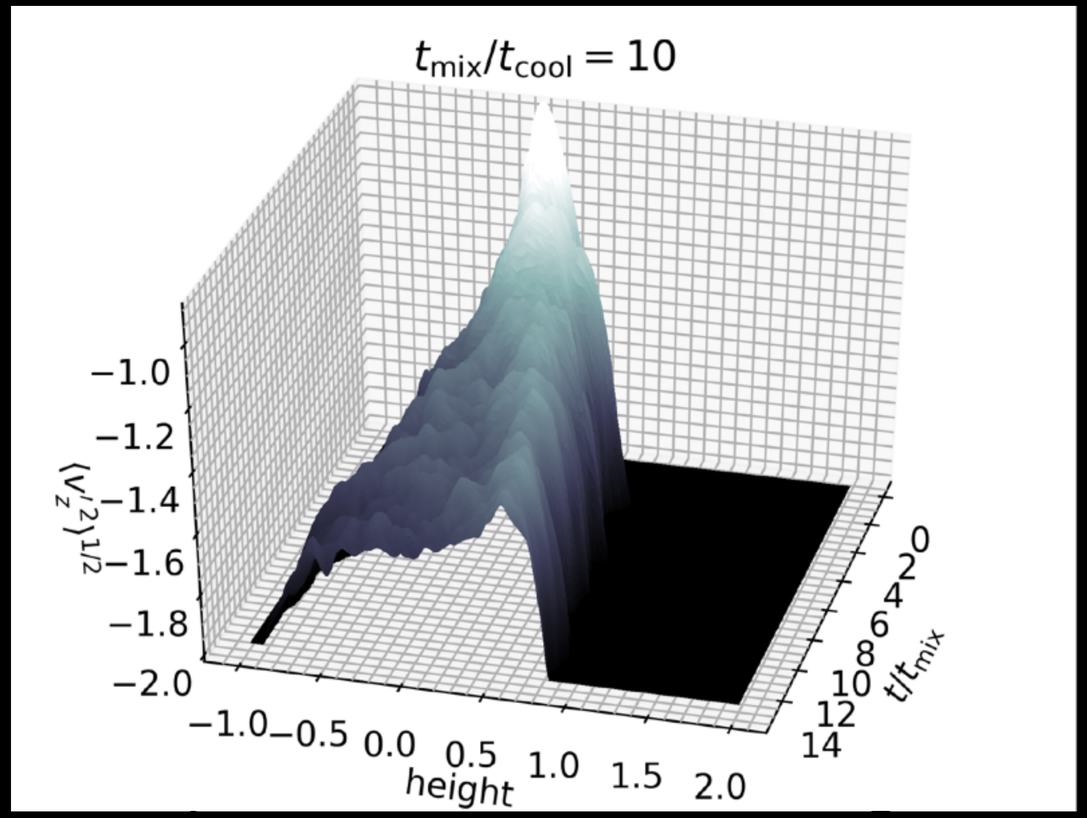
Turbulence and the kinetic energy budget





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$$\partial_t \int_0^h E_{turb}\, dz = -\int_0^h \frac{1}{2}\rho v_{turb}^3/L\, dz, \text{ if } E_{turb} \sim \text{const then } \partial_t(hE_{turb}) = \dot{E}_{turb}h + \dot{h}E_{turb} = -\frac{h}{L}\sqrt{\frac{2}{\rho}}E_{turb}^{3/2}$$