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Transient mixing in turbulent open channel subject to radiative heating VASSILI ISSAEV, NICHOLAS WILLIAMSON, STEVE ARMFIELD, Univ of Sydney, STUART NORRIS, University of Auckland — The temporal evolution of initially neutral turbulent open channel flow subject to radiative surface heating through the Beer-Lambert law is examined through direct numerical simulations. As the flow transitions to stably stratified conditions we observe three distinct regimes in time. Initially the temperature field acts as a passive scalar growing directly in proportion to depth varying heat-source $q(z)$ with turbulence largely unaffected. A second transient period is observed in which the flow begins to move towards local energetic equilibrium. During this regime a strong transient effect is observed whereby the turbulence micro-structure of the flow is still relatively unaffected by buoyancy, however the local buoyancy gradient N^2 is significantly large. As stable stratification begins to affect the smallest scales of the flow a final temporal regime is observed whereby the flow becomes independent of transient effects and instantaneous mixing can be again be estimated from local measurements of Froude number $Fr = \frac{\epsilon}{Nk}$.

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