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Homogeneous purely buoyancy driven turbulent flow JAYWANT ARAKERI, Indian Institute of Science, Bangalore-12, MURALI CHOLEMARI, Indian Institute of Technology, Delhi, SHASHIKANT PAWAR, Indian Institute of Science, Bangalore-12 — An unstable density difference across a long vertical tube open at both ends leads to convection that is axially homogeneous with a linear density gradient. We report results from such tube convection experiments, with driving density caused by salt concentration difference or temperature difference. At high enough Rayleigh numbers (Ra) the convection is turbulent with zero mean flow and zero mean Reynolds shear stresses; thus turbulent production is purely by buoyancy. We observe different regimes of turbulent convection. At very high Ra the Nusselt number scales as the square root of the Rayleigh number, giving the so-called "ultimate regime" of convection predicted for Rayleigh-Benard convection in limit of infinite Ra. Turbulent convection at intermediate Ra, the Nusselt number scales as $Ra^{0.3}$. In both regimes, the flux and the Taylor scale Reynolds number are more than order of magnitude larger than those obtained in Rayleigh-Benard convection. Absence of a mean flow makes this an ideal flow to study shear free turbulence near a wall.

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