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Direct Numerical Simulation of turbulent mixed convection in thermally-stratified channel flow FRANCESCO ZONTA, ALFREDO SOLDATI, Dept. Energy Technologies, University of Udine — Direct numerical simulation of turbulence was used to study the evolution of thermally-stratified channel flow. We studied both stable and unstable stratification and we investigated the influence on the flow evolution of both viscosity and thermal expansion coefficient, which depend on temperature. We compared the obtained results against a companion base simulation of neutrally-buoyant (unstratified) flows. Statistical results and instantaneous flow field visualizations gathered for different values of the flow Reynolds number will be shown to highlight the role played by buoyancy and mean shear in mixed convection problems. Large-scale thermal convection associated to enhanced wall-normal momentum transport is observed for unstable stratification; whereas internal gravity waves accompanied by reduced momentum transport efficiency is observed for stable stratification.

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