# Evaluation of the standard $k$-$\varepsilon$ closure scheme for modelling stably stratified wall-bounded turbulence

Amrapalli Garanaik, Farid Karimpour and Subhas K. Venayagamoorthy
Department of Civil and Environmental Engineering, Colorado State University

**Abstract.** Geophysical flows are stably stratified turbulent flows and are governed by Boussinesq approximated Navier Stokes equations. For engineering applications, widely used cost effective numerical method for solving fluid flow problem is Reynolds-averaged Navier-Stokes (RANS) equations which uses turbulence model for modelling stratified turbulent flows. The focus of this study is to account for the effect of the buoyancy forces in the two-equation standard $k-\epsilon$ closure scheme for modeling stably stratified wall-bounded turbulence where $k$ and $\epsilon$ are turbulent kinetic energy and rate of dissipation of turbulent kinetic energy respectively. The buoyancy parameter $C_{\epsilon 3}$ in the evolution equation of the dissipation rate of the turbulent kinetic energy is analytically revisited and it is found that it can be neglected. Numerical simulations are implemented in a 1-D water column model and the results are compared with the DNS data of stably stratified channel flow.