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A study of speed-up behavior in neutral and stably-stratified boundary layer flows over complex terrain

Jose Luis Argain
University of Algarve, Physics Department, Faro, Portugal, jargain@ualg.pt

In this work, it is studied the dependence of the relative speed-up on stability and orography shape in neutral and stably-stratified turbulent boundary layer flows over complex orography. Numerical simulations are carried out using a non-hydrostatic mesoscale numerical model, which has been validated previously with observations. The numerical results are also used for assessing the performance of a theoretical model, based on a combination of the linear model of Hunt et al. (1988a) with several modifications, to allow for its application to the studied cases. Simulations show a significant dependence, of the magnitude and location of the maximum relative speed-up value, on the stability and orography characteristics.