



## **Evaluation of dynamic subgrid-scale models in large-eddy simulations of turbulent flow over a two-dimensional sinusoidal hill**

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Large-eddy simulation (LES) was used to simulate turbulent boundary-layer flow over a rough two-dimensional sinusoidal hill with two different roughness heights. Three different subgrid-scale (SGS) models were tested: (a) the standard Smagorinsky model with a wall-matching function, (b) the Lagrangian dynamic model, and (c) the recently developed scale-dependent Lagrangian dynamic model [Stoll and Porte-Agel, 2006]. The simulation results obtained with the different models are compared with turbulence statistics obtained from experiments conducted in the meteorological wind tunnel of the AES (Atmospheric Environment Service, Canada) [Gong et al., 1996]. We find that the scale-dependent dynamic model is able to account, without any tuning, for the local changes in the eddy-viscosity model coefficient. It can also capture the scale dependence of the coefficient associated with regions of the flow with strong mean shear and flow anisotropy. As a result, the scale-dependent dynamic model yields results that are more realistic than the ones obtained with the standard Smagorinsky and scale-invariant Lagrangian dynamic models.