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This study presents results of numerical experiments of neutrally-stratified turbulent flows over idealized urban surfaces using a Large-Eddy Simulation (LES) model. It is shown that the turbulent length scales necessary for the formulation of multilayer local one-dimensional Reynolds-Averaged Navier–Stokes (RANS) models of the urban canopy are related to the spatial spectra of turbulence. An algorithm based on the application of Taylor's frozen turbulence hypothesis is proposed to compute an analog of the spatial velocity spectrum inside an urban layer containing objects («buildings»). A qualitative explanation of the dependence of length scales on the morphological characteristics of the urban surface is given.

Keywords: atmospheric boundary layer, urban canopy, large-eddy simulation, LES, turbulence spatial spectra

Tab. 1. Fig. 3. Ref. 36.