Abstract Submitted
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Turbulent transport of momentum and scalars in urban-like geometries QI LI, ELIE BOU-ZEID, Department of Civil and Environmental Engineering, Princeton University, US, WILLIAM ANDERSON, Department of Mechanical Engineering, University of Texas at Dallas, US, SUE GRIMMOND, Department of Meteorology, University of Reading, UK — A numerical study is carried out using large-eddy simulations to investigate the mechanisms of turbulent transport of momentum and passive scalars over urban-like geometries. The immersed boundary method is used to represent buildings; this induces "ringing," i.e. the Gibbs phenomenon associated with the use of spectral discretization in domains with sharp discontinuities. We present a new approach to reduce this ringing and improve the numerical accuracy of the method. Topological parameters, such as the frontal area index and the plan area index, were varied to examine their impact on turbulence and transport characteristics. The heterogeneity of the surface is shown to increase both the heteorogeneity and anisotropy of the flow, and to significantly modulate the efficiencies of momentum and passive scalar transport.

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