



Analysing interscale energy transfer in urban boundary layer turbulence using orthonormal wavelets

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The transfer spectrum characterises nonlinear energy transfers from one scale to another. It is of great theoretical and practical importance in homogeneous turbulence; it may be generalised to inhomogeneous turbulence using wavelets, in which case the transfer depends on scale and spatial location. In this study, wavelets are applied to the study of inhomogeneous turbulence in an idealised urban domain. Using large-eddy simulation and orthonormal wavelets, the interscale energy transfer is calculated and comparisons made with the usual Fourier spectrum. Spatial variability is also quantified (with the standard deviations or dual spectra) and the anisotropy examined. This work is relevant to the development of multiscale urban canopy parameterisations that seek to model the energy transfers between the mesoscale and urban scale.