



Multiscale plant wakes, turbulence and non linear scaling flexible effects

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We present velocity ADV measurements and flow visualization of the turbulent wakes behind plant arrays, as these are often fractal in nature, we compare the multifractal spectra and the turbulence structure behind the wakes. Both statistical measures allowing to calculate integral lengthscales and their profiles modified by the plant canopies [1,2] as well as intermittency and spectral behaviour are also measured [3,4]. We distinguish several momentum transfer mechanisms between the canopy and the flow, an internal one where lateral turbulent tensions are dominant, and another one just above the plant average height dominated by vertical Reynolds stresses. Visualization of flow over individual plant models show the role of coherent vortices triggered by plant elasticity. The deformation rate of the plants and their Young's modulus may be correlated with overall plant drag and geometry. This is modified strongly in fractal canopies. Large turbulent integral scales are linked to rugosity and the scaling of the waves.[5,6] Pearlescence experiments where local shear is visualized and numerical simulations of Fractal grids are compared following [7].

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