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Analytical proposed of deterministic perturbations of the wind. Fractal dimension.

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We have developed an analytical technique for filtering deterministic perturbations from power spectrum in fully developed turbulent flow. These perturbations are generated by the flow of deterministic waves over the mean wind in the atmospheric boundary layer. The model of perturbation proposed consists in an amplitude and frequency decreasing with time in an exponential way in a given bandwidth of frequency. This method is initially applied to numerical simulations of the time series, these are obtained adding a time series of random data to the model of perturbation proposed. The analytical procedure allows us to filter the perturbation analysed and get white noise in the power spectrum. Lately, we apply this method to each one of the components x, y and z (u,v,w) of the real series of wind velocity measured by a sonic anemometer. Beyond of the application of method, the experimental results show that some peaks going below the 99 % significance level of the power spectrum. Therefore, they must obey the model of perturbation we have advanced in this research. Thus, we obtain a much more stochastic series. This process of filtering will allow us to study the stochastic nature of isotropic turbulence in the atmospheric boundary layer, as well as the Hausdorff-Besicovitch fractal dimension in these turbulent flows.