

Monitoring of Stable Boundary Layer Characteristic Using the Electrical Measurements

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In the last two decades our understanding of the nature of atmospheric and oceanic turbulence and planetary boundary layers (PBLs) has been revised conceptually taking into account the self-organization processes that strongly affect turbulent transports and make them essentially non-local [1]. The analysis of electric parameters and particularly the electric field spectra gives additional useful information on the parameters of the atmospheric boundary layer and its turbulence. It was found that the rather sharp change in the spectrum slope takes place in the vicinity of 0.02 Hz under stable conditions [2]. The characteristic slope of the spectrum and its change are reproduced in a simple model of electric field pulsation formation. We have developed the detailed model of electro-hydrodynamic turbulence in the stable PBL and performed the numerical simulations for electric field spectra. The model showed a good agreement with the experimental results. The analysis showed that electrical measurements provide a powerful monitoring methods of stable boundary layer characteristic such the PBL height, wind-speed profile and distribution of charges over the probe sources.

References:

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