Taylor's Approach for Turbulence Parameterization of the Planetary Boundary Layer in the B-RAMS Model

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ABSTRACT

Accounting for the current knowledge of the Planetary Boundary Layer (PBL) structure and characteristics, a new set of turbulence parameterizations to be used in meso-scale meteorological models has been developed. That is, expressions for the vertical profiles of the eddy diffusion coefficient K_i ($i = u, v, w$) are implemented. Using the classical statistical diffusion Taylor's theory [5], and observed spectral properties and characteristics of energy containing eddies are employed to estimate these parameters [1]. The results of this scheme are shown to agree with previously used parameterizations, and observations too. These parameterizations give continuous values for the PBL at all levels $0 = z = h$, and all stability conditions: $-8 = L = 8$, where h is the PBL height and L is the Monin-Obukhov length. The new parameterizations are implemented in the B-RAMS, a meso-scale meteorological model [3]. Finally, a validation of the present parameterization is compared with other parameterizations: Smagorinsky [4] and Mellor-Yamada [2], and observational data collected from the Large Scale Biosphere (LBA) experiment.

References

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