EMS7/ECAM8 Abstracts,
Vol. 4, EMS2007-A-00163, 2007
7th EMS Annual Meeting / 8th ECAM


# On the full tensor of the turbulent exchange coefficients in PBL

**E. Syrakov**, M. Tsankov

University of Sofia, Faculty of Physics, Department of Meteorology and Geophysics,Bulgaria.
(esyrakov@phys.uni-sofia.bg / Fax: 359 (2) 962 5276 / Phone: +359 (2) 8161 315)

The work presents a model for calculating the full tensor of the turbulent exchange coefficients in PBL $K_{ij}$ over horizontally homogeneous earth surface, taking into account the factors: wind turning with height, stratification, roughness, baroclinicity, inversion, and terrain slope. Model is based on the approach of Freemans (1977) (using second order turbulent closure), with weak modification of the remake of the equation of the turbulent kinetic energy (TKE) and using a PBL model taking into account the counted above factors in similarity format. It is studied in details the profiles of $K_{ij}\,(z)$ at $i = j$ (diagonal) and $i \neq j$(nondiagonal) components. The model is verified with some data from the surface layer (SL). The condition $k_{xy} = k_{yx} = k_{zy} = k_{yz} = 0$ is strictly fulfilled in the surface layer. It is obtained that the rest components of $k_{ij}$ in the surface layer vary linearly with the height $z$ at neutral case and reach approximately constant values ($z$- less regime) for the stable case above 10 m, which is in full accordance with the theoretical similarity considerations. It is explored the conditions at which the components $K_{ij}\,(i \neq j)$ are most significant as well as the case of free convection at unstable conditions when the nondiagonal terms are zero. In the last case it is obtained and respective relations between the diagonal components$K_x$, $K_y$ and $K_z$.

The developed approache can be used for more accurate parameterization of the exchange turbulent processes in different spatial directions in PBL at wide range of turbulent regimes.