Bigaussian model for the forth order moments in the convective boundary layer

G. Pagnini (1), **M. Zampieri** (2)

(1) ENEA - Via Martiri di Monte Sole 4, I-40129 Bologna IT (2) LMD-ENS, 24 rue Lhomond, 75231 Paris Cedex 5, FR (gianni.pagnini@bologna.enea.it, m.zampieri@lmd.ens.fr)

A new non-local model for the cumulants of the forth order moments in the convective boundary layer is proposed. It is based on the bigaussian bivariate probability density function for the vertical velocity and temperature fluctuation. The new closure model provides the algebraic parameterizations of the mixed moments that are required for the integration of the Reynolds equations by invoking the consistency with the observed distribution of the vertical velocity and temperature kurtosis with respect to the skewness. Following only two experimental-fitting parameters, the proposed approach turns out to be more versatile then the two-scale mass-flux approach of Gryanick and Hartmann (2005) or the top-down procedure of Cheng et al. (2005). The bigaussian model is implemented in a third order model of the convective boundary layer. The results of the simulation compare well with the observations. Moreover, the new model provides the statistical characterization of the single updrafts and downdrafts, thus it is recommended also for applications in dispersion studies of chemical species.