

Progresses in two equations boundary layer modelling

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A new turbulent kinetic energy dissipation equation for the two equations E-epsilon closure model is presented. Previous proposals for the neutrally stratified, sheared, rotating atmospheric boundary layer are generalized in order to take into account the effects of non-stationarity and of horizontal inhomogeneity and to be applied in the statically unstable case as well. In the stable case, the consistency of the equilibrium solution of the epsilon equation with the Deardorff mixing length model is invoked. The new model recovers the results of the one equation E-l model in a wide range of regimes of the horizontally homogeneous boundary layer, where this latter model is known to give reliable results. The new E-epsilon model, being more general, can be employed as boundary layer parameterization in complex terrains and as turbulence parameterization for the upper troposphere. Thus it is recommended as turbulence closure in high-resolution mesoscale meteorological models.