



Accurate numerical solution and analytical approximation for the wind profile over flat terrain

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An accurate numerical procedure for calculating the vertical profile of wind speed and wind direction over flat terrain for a given exchange coefficient profile is presented together with an analytical approximation.

The profiles can be used in local wind or air quality studies over flat terrain. In contrast to simpler analytical profiles, they provide a consistent treatment of both wind speed and wind direction, the latter in particular as well close to the ground. In contrast to prognostic wind field models, they demand considerably less computation power. However, they provide a smooth transition to the profiles resulting from prognostic wind field models in the limit of flat and homogeneous terrain.

The presented profiles are part of the revised German guideline VDI 3783 Part 8 (turbulence parameters for dispersion models). This guideline is applied for example by the dispersion model of the German Regulation on Air Quality Control TA Luft (Lagrangian particle model AUSTAL2000).