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Compact framework of stability dependency functions for turbulent schemes with prognostic TKE.

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There exists nowadays a variety of schemes, which provide stability dependency functions for parameterisation of turbulence with prognostic TKE. Most latest developments in dry air turbulence aim at a correct asymptotic behaviour of stability dependency functions for high stability, with consideration of anisotropy and absence of critical Richardson number Ri_{cr}, i.e. existence of turbulent mixing in all stratifications. Beyond classical Mellor-Yamada (MY) inspired solutions, more advanced compact schemes with these properties are for instance the declination of non-Reynolds-type Quasi Normal Scale Elimination (QNSE) theory (Sukoriansky et al., 2005) and the solution given by the Energy and Flux Budget (EFB) theory (Zilitinkevich et al., 2013).

The target of our presentation is to explain a new simple framework able to emulate a wide amount of stability dependency functions having the above properties, including of course those of EFB and of QNSE. The said framework is based on two complementary but surprisingly converging modifications of the Cheng et al. 2002 MY-type turbulent scheme. The simplification or emulation steps differ from one case to the next, but the obtained common framework is very compact, valid for Ri going from $-\infty$ to $+\infty$, depending only on four free parameters and on three "functional dependencies". Four realisations of our codification are representative of all currently related possibilities, the analytical scheme thus possessing a rather high transversal validity.

Extension towards higher order solutions and/or moist turbulence can then be safely envisaged in such an unified framework, with better perspectives of obtaining transversally valid solutions.