A Derivation of the Epsilon Equation from a Two-point Closure Turbulence Model

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Traditionally, the ε equation is constructed using one-point closure turbulence models. Here we present a new derivation of the ε equation based on a parameter-free, two-point closure turbulence model (Canuto-Dubovikov, 1993-1999), which is integrated over all wavenumbers and combined with an improved split-spectrum method. The structure of the ε equation thus obtained is identical to the phenomenological one and the calculated coefficients c_1 and c_2 are in good agreement with the empirical values. Finally, as production approaches dissipation, both c_1 and c_2 approach the value as required by the stationary condition.