



Beyond eddy diffusivity – A new model for turbulent dispersion

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Turbulent dispersion proceeds not only much faster but also in a qualitatively very different manner than molecular diffusion. Yet, the majority of oceanic and atmospheric models rely on the concept of an eddy diffusivity. It is shown here that an alternative model can be developed to exhibit observed behavior.

The new term in the diffusion equation, which is non-local, can be interpreted in terms of the probability density distribution (pdf) of the turbulent velocity. Different assumptions about this distribution lead to a family of models, one of which is the model proposed and another the classical Fickian model of diffusion. A connection is also made with recent models using fractional calculus.