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On the Representation of Reynolds Stress in Estuaries and Shallow Coastal Seas

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ABSTRACT

A model for the representation of the Reynolds-stress tensor in three-dimensional hydrodynamic models of shallow water flows is derived which combines the accuracy of turbulence-energy closure schemes with the computational efficiency of algebraic eddy viscosity models. The proposed model assumes, the eddy-viscosity tensor to have structural similarity, from which it is shown that its magnitude is scaled on the depth-mean turbulence energy and the depth-mean turbulence-energy dissipation rate, while the vertical structure is described by a suitable similarity function, two alternatives of which are derived. The similarity assumptions used in the analysis are verified and the model is tested by application to steady and tidal flows.

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