An Improved Single Point Closure Model Based on Dissipation Anisotropy for Geophysical Turbulent Flows

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Abstract : This paper is a continuation of the work carried out by various turbulence modelers in Oceanography on the topic of oceanic turbulent mixing. It evaluates the evolution of ocean water temperature and salinity by the appropriate modeling of turbulent mixing utilizing proper prescription of eddy viscosity. Many modelers in past have suggested including terms like shear, buoyancy and vorticity to be the parameters that decide the slow pressure strain correlation. We add to it the fact that dissipation anisotropy also modifies the correlation through eddy viscosity parameterization. This recalibrates the established correlation constants slightly and gives improved results. This anisotropization of dissipation implies that the critical Richardson's number increases much beyond unity (to 1.66) to accommodate enhanced mixing, as is seen in reality. The model is run for a couple of test cases in the General Ocean Turbulence Model (GOTM) and the results are presented here.
Keywords : Anisotropy, GOTM, pressure-strain correlation, Richardson critical number

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