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Characteristics of the Residual Stress tensor when filter width is larger than the Ozmidov scale. FELIPE AUGUSTO DE BRAGANA ALVES, STEPHEN DE BRUYN KOPS, Univ of Mass - Amherst — In stratified turbulence, the residual stress tensor is statistically anisotropic unless the smallest resolved length scale is smaller than the Ozmidov scale and the buoyancy Reynolds number is sufficiently high for there to exist a range of scales that is statistically isotropic. We present approximations to the residual stress tensor that are derived analytically. These approximations are evaluated by filtering data from direct numerical simulations of homogeneous stratified turbulence, with unity Prandtl number, resolved on up to $8192 \times 8192 \times 4096$ grid points along with an isotropic homogeneous case resolved on 8192^3 grid points. It is found that the best possible scaling of the strain rate tensor yields a residual stress tensor (RST) that is less well statistically aligned with the exact RST than a randomly generated tensor. It is also found that, while a scaling of the strain rate tensor can dissipate the right amount of energy, it produces incorrect anisotropic dissipation, removing energy from the wrong components of the velocity vector. We find that a combination of the strain rate tensor and a tensor related to energy redistribution caused by a Newtonian fluid viscous stress yields an excellent tensorial basis for modelling the RST.

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