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Large Eddy Simulations of Decaying Rotating Turbulence

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Large eddy simulations of homogenous isotropic turbulence subjected to system rotation were performed using the Truncated Navier–Stokes method. We observe that the nonlinear energy transfer from large to small scales is reduced by rotation, the energy decay is inhibited, the energy spectrum at high Reynolds numbers departs from the classical Kolmogoroff form, and initially isotropic turbulence becomes anisotropic, with the anisotropy reflected in longitudinal integral length scales and directional stress tensors. Contrary to conclusions reached for low Reynolds number flows, at high Reynolds numbers and sufficiently long times the Reynolds stress tensors and their invariants become anisotropic as well. The anisotropy is responsible for the spectral slope of -3 rather than the classical slope of -2 found under the assumption of isotropy.

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