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Leith diffusion model for homogeneous anisotropic turbulence ROBERT RUBINSTEIN, Computational Aerosciences Branch, NASA Langley Research Center, Hampton VA, TIMOTHY CLARK, Department of Mechanical Engineering, University of New Mexico, Albuquerque NM, SUSAN KURIEN, Theoretical Division, Los Alamos National Laboratory, Los Alamos NM — A new spectral closure model for homogeneous anisotropic turbulence is proposed. The systematic development begins by closing the third-order correlation describing nonlinear interactions by an anisotropic generalization of the Leith diffusion model for isotropic turbulence. The correlation tensor is then decomposed into a tensorially isotropic part, or directional anisotropy, and a trace-free remainder, or polarization anisotropy. The directional and polarization components are then decomposed using irreducible representations of the SO(3) symmetry group. Under the ansatz that the decomposition is truncated at quadratic order, evolution equations are derived for the directional and polarization pieces of the correlation tensor. Numerical simulation of the model equations for a freely decaying anisotropic flow illustrate the non-trivial effects of spectral dependencies on the different return-to-isotropy rates of the directional and polarization contributions.

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