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Anisotropy in MHD turbulence with mean field: zero parallel cascade?

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The anisotropy in MHD turbulence with mean field is generally believed to be controlled by the balance between the nonlinear perpendicular and the linear parallel times scales.
While in some cases, this has been verified, other cases deviate from this prediction.
A particularly strong point in the critical balance theory is the hypothesis that, when the mean field is strong enough, no genuine nonlinear coupling acts along the mean field direction, the spectrum along this direction being the sole byproduct of the linear transport of small scales generated in the perpendicular direction.
This hypothesis is also the justification for the reduced MHD equations (Strauss equations) in which the parallel nonlinear terms are suppressed. Another interesting model is the Atm-shell model, which is based on the reduced MHD equations, but with a strong reduction of the number of coupling terms in Fourier space.
In principle, this model should be a perfect case for applying the critical balance theory.
We compare three models of turbulence with mean field and large-scale isotropic forcing
(1) periodic box, direct integration of incompressible 3D MHD equations
(2) open box with purely linear propagation along mean field direction, with shell models at each mesh point z (describing perpendicular turbulent cascades), forcing at boundaries
(3) same but semi-reflecting boundaries, suitable for application to the coronal heating issue
The resulting energy spectra are compared. One finds that all cases show specific anisotropies which all differ deeply from the critical balance prediction.