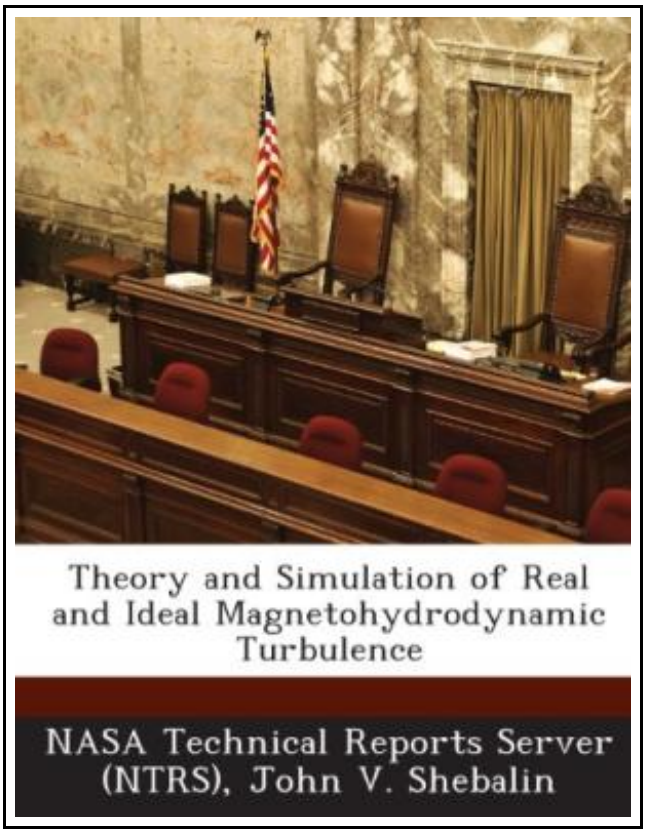
# Theory and Simulation of Real and Ideal Magnetohydrodynamic Turbulence

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# THEORY AND SIMULATION OF REAL AND IDEAL MAGNETOHYDRODYNAMIC TURBULENCE



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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 34 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.Incompressible, homogeneous magnetohydrodynamic (MHD) turbulence consists of fluctuating vorticity and magnetic fields, which are represented in terms of their Fourier coefficients. Here, a set of five Fourier spectral transform method numerical simulations of two-dimensional (2-D) MHD turbulence on a 512(sup 2) grid is described. Each simulation is a numerically realized dynamical system consisting of Fourier modes associated with wave vectors k, with integer components, such that k k less than or equal to k(sub max). The simulation set consists of one ideal (non-dissipative) case and four real (dissipative) cases. All five runs had equivalent initial conditions. The dimensions of the dynamical systems associated with these cases are the numbers of independent real and imaginary parts of the Fourier modes. The ideal simulation has a dimension of 366104, while each real simulation has a dimension of 411712. The real runs vary in magnetic Prandtl number P(sub M), with P(sub M) is a member of 0. 1, 0. 25, 1, 4. In the results presented here, all runs have been taken to a simulation time of t 25. Although ideal and real Fourier spectra are quite different at high k, they are similar at low values of k. Their low k behavior indicates the existence of broken symmetry and coherent structure in real MHD turbulence, similar to what exists in ideal MHD turbulence. The value of PM strongly affects the ratio of kinetic to magnetic energy and energy dissipation (which is mostly ohmic). The relevance of these results to 3-D Navier-Stokes and MHD turbulence is discussed. This item ships from La Vergne,TN. Paperback.

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