

## Testing the mezofractal power spectrum for ISM by comparing with numerical MHD calculations

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For understanding cosmic ray propagation through the interstellar medium (ISM), an adequate model for the latter is needed. The ordinary diffusion approach, leading to the Brownian motion, assumes independence of ISM local inhomogeneities, such as molecular clouds and magnetic fluctuations. The long-range turbulent correlations created by magnetic force lines and gravitation forces require a special representation of these ISM properties. Pure power kind turbulent spectra occur to be too poor for this aim, and moreover, do not show acceptable agreement with last MHD calculation results. A more perspective spectra is obtained on the basis of statistical mechanics and promises to be more efficient. These include the Uchaikin-Zolotarev four-parameter mesofractal power spectrum [1], obtained by solving the Ornstein-Zernike equation using three-dimensional stable Levi-Feldheim distributions. These parameters provide its flexibility (the ability to approximate well the numerical results of various calculations) and are easily amenable to kinetic interpretation within the framework of the concept of Markov breaking chains [2].

The report shows successful applications of this spectrum to the approximation of the numerical results of two MHD calculations [3,4].

References:

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