

Short talk

FLUCTUATING GOVERNING PARAMETERS IN GALAXY DYNAMO

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Evolution of galaxy magnetic fields is described by the so-called dynamo theory. The equations include governing parameters that describe alpha-effect, differential rotation and turbulent diffusion. Usually these coefficients are connected with average kinematic characteristics of the interstellar medium. This approach is possible for “calm” galaxies. However, if there is intensive star formation, supernova explosions and other active processes, the parameters of the interstellar gas change. The distribution of the regions where the velocities of the interstellar medium are different is quite random. So it is useful to use the model of the galaxy dynamo with random coefficients (Moss et al 2015). Previous papers described fluctuating alpha-effect (Mikhailov, Modyaev 2015), but it is necessary to take into account the turbulent diffusion, too.

We use so-called no- z approximation to study the magnetic field (Moss 1995). It takes into account that the galaxy disc is thin, so the z -derivatives can be changed by algebraic expressions. We describe the fluctuations of alpha-effect and turbulent diffusion coefficients. Both asymptotic estimates of the field growth rate and the numerical simulations for such model have been made.

We have shown that the magnetic field can be changed a lot even for quite small fluctuations of the dynamo governing parameters. For example, the star formation that is 5-7 times higher than in the Milky Way can destroy the regular magnetic field.

References

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