

Long-term variations in solar dynamo by the non-linear shear induced alpha-effect.

V.V.PIPIN

ISTP, Irkutsk. Email: pip@iszf.irk.ru

We explore the influence of the large-scale shear and magnetic fluctuations on the alpha-effect in stratified atmosphere. It is shown that interaction between the small-scale dynamo and differential rotation results to an additional important contribution to the alpha-effect generation of the large-scale magnetic field. This contribution behaves non-monotonically with the strength of large-scale magnetic field. We investigate the influence of this findings on the numerically modelled long-term behaviour of the solar-type dynamo. The axisymmetric numerical dynamo model includes the self-consistent description of the angular momentum balance, heat transport and magnetic field generation in the spherical shell. We find that induced by the shear alpha-effect can cause the long-term quasi-regular variations in magnetic activity and differential rotation.

Additionally we consider the possible long-term variations of luminosity and solar radius which are modulated by changes in the large-scale magnetic fields and rotation.