

Estimation of turbulent pumping in the solar near-surface convection zone

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We estimate the turbulent transport coefficients of the mean field model of solar dynamo process using the three-dimensional radiation magnetohydrodynamic simulations. The number of studies has been devoted to investigate the mean field description of the solar dynamo process. Large uncertainty of this model comes from the turbulent transport coefficients like the turbulent diffusion, alpha effect, or turbulent pumping. Although various numerical and observational studies has been estimated the turbulent transport coefficients, very few studies focused on the near-surface values of the vertical transport coefficients. These vertical transport coefficients in the near-surface convection zone is important for characterizing the upper boundary of the solar dynamo models. In this study, we estimate the vertical transport coefficients such as the turbulent diffusion and pumping using the large-eddy numerical simulation. The realistic near-surface convection is modeled by the three-dimensional radiation magnetohydrodynamic simulations. In the presentation, we report the wavenumber dependence of the transport coefficients and suggest a suitable upper boundary condition of the solar dynamo models.

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