NUMERICAL SIMULATION OF THE FISK MODEL

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We present an application of the Fisk model to numerical simulation. The Fisk model assumes that the open magnetic flux of the sun remains virtually constant during the solar cycle compare to the total flux, and therefore, its evolution can be described as a transport process. The convection of open magnetic flux is due to solar differential rotation and meridional flow. The diffusion of open magnetic flux is due to random motion of the field-line footpoints in the photospheric network lanes, and due to magnetic reconnection of open field-lines with closed loops. The latter, is non-uniform, dependent on the open magnetic flux density, and on the rate of emergence of loops on the surface of the sun. We numerically simulate the Fisk model to investigate the evolution of the open magnetic flux on the solar photosphere and corona. The magnetic reconnection is applied to the code through a diffusion coefficient as described by Fisk (2005). We will discuss our results and its importance to understanding the evolution of the solar magnetic field and solar wind acceleration.