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PEM30-03 会場:503 時間:4 月 30 日 15:30-15:45

衛星データと画像自動認識手法を利用した太陽表面磁束輸送の研究
Investigation of magnetic flux transport on the solar surface based on satellite data and auto-tracking technique

飯田 佑輔 [1*]
IIDA, Yusuke[1*]

[1] 宇宙航空研究開発機構/宇宙科学研究所
[1]ISAS/JAXA

Spatial displacement of patch structure on the solar surface is investigated based on satellite data and auto-tracking technique.

Magento-convection system on the solar surface is thought to be important not only as a cause of various solar activities but also as an actual observable magneto-convection on the stellar surface. One important issue is how magnetic flux is transported there. In global scale, the transport of magnetic field is treated as a diffusion now. However it is not clear that diffusion treatment is appropriate in magneto-convection system. The aim of this study is to understand if the diffusion treatment of magnetic field transport in global scale is good or not.

I investigate the dependence of mean-square displacement on elapsed time by using auto-tracking technique, which is thought to be one of the critical characteristics for global-scale description of transport.

The longest magnetogram data obtained by Hinode/FG is used. In that data, number of tracked patches is enough for statistical study, more than 40000. The obtained dependence show a different character above and below the point of L~10^4 km. Below that scale, it has a power-law dependence with an index of ~-1.4, namely super-diffusion scheme. However, in the larger scale, the power-law dependence becomes ~-0.6, namely sub-diffusion scheme. These characters can be explained by the network flow pattern qualitatively. Below the network scale, patch is transported by constant flow (~0.3km s^{-1}) from center of network cell to edge of the cell addition to the large (~1km s^{-1}) perturbing flow of granulation. On the other hand, above the network scale, patches experience the trapping around stagnation point of network flow, which makes displacement of patch shorter than that only by diffusion motion.

キーワード: 太陽, 磁場, 対流, 拡散, 画像自動認識
Keywords: the Sun, magnetic field, convection, diffusion, feature recognition