

fields are separately calculated from a Big Bear magnetogram obtained under excellent seeing condition allowing high spatial resolution of 1.5 arcsec together with a high sensitivity reaching 2 Mx cm^{-2} . Seeing effect on power spectrum has been corrected using Korff's Modulation Transfer Function that was determined in our previous study of solar seeing quality of the magnetogram observation.

In our results, the power spectra of both network fields lie in the inertial subrange for the most wavenumbers observable, in contrast to the earlier notion that they would lie beyond the inertial subrange (Nakagawa and Priest, 1971; Knobloch and Rosner, 1981). The network field spectrum is closely approximated by a power law with spectral index of $-3/2$ consistent with Kraichnan's (1959) theory for turbulent magnetic fields in equipartition with turbulent fluids. The $-3/2$ power law is followed by a more rapid decaying spectrum at wavenumbers larger than 3 Mm^{-1} , which we attribute as the convective subrange based on an independent estimate of the Prandtl number under solar condition. The non-network field spectrum is better represented by the Kolmogorov law. Based on theory of Obukov (1949) and Corrsin (1951), it is concluded that non-network fields may act as a scalar contaminant passively responding to isotropic turbulent flows in the photosphere. A spectral maximum of non-network field spectrum locates at 0.7 Mm^{-1} , about the size of the largest granulation, which is thus interpreted as an evidence for the granulation origin of non-network fields. Turbulent parameters such as transport coefficients and the rate of kinetic energy dissipation per unit mass are derived. Implication of our results on distinct nature of network and non-network fields is discussed.

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태양광구영역에서의 광구벡터 자기장 진화

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편광 복사 전달계산을 수행함으로써 관측된 특정 파장에서의 편광정도를 자기장의 세기로 변환시키는 벡터 마그네토그래프의 이론적인 눈금조정을 수행하였다. 본 계산에서 대기모델은 Avertt(1990)의 VAL-C모델, Ding and Fang(1989)의 흑점 반영모델 그리고 Matby(1986)의 흑점분영모델에 대하여 각각 계산을 수행하였다.

열역학적 평형을 가정한 편광 복사 전달식을 수치계산하여 얻어진 편광복사선(Fe I 6302.5)의 스톡스 선운곽들에 대해 투과대역이 0.125Å 인 가우스 분포를 가정함으로써 Lyot 필터의 투과효과를 고려하였다. 자기장의 세기와 자력선의 기울기 변화에 따른 각 스톡스 선운곽을 계산하고 자기장의 세기에 따른 직선, 원편광 정도를 나타내는 눈금조정 곡선을 결정하였다. 이 결과를 Mitaka 관측소에서 사용하고 있는 관측자료분석 소프트웨어에 적용함으로써 활동영역에서의 벡터자기장 지도를 만들었다.

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