SOME COMMENTS ABOUT CORRELATIONS BETWEEN MAGNETIC FIELD AND VELOCITY, MAGNETIC FIELD AND LINE INTENSITY IN THE UNDISTURBED PHOTOSPHERE

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1. Observations

Test cross-correlation functions between the magnetic field recordings and the sight-line velocity recordings with East and West relative lag for two regions near the centre of the disk have been computed. We have also found the deviations of the absolute value of the magnetic-field strength $|H|$ from the mean absolute value of magnetic-field strength $|\bar{H}|$ for the whole region. The same procedure for the velocity field has been made. The cross-correlation functions for these deviations have also been computed (Figure 1).

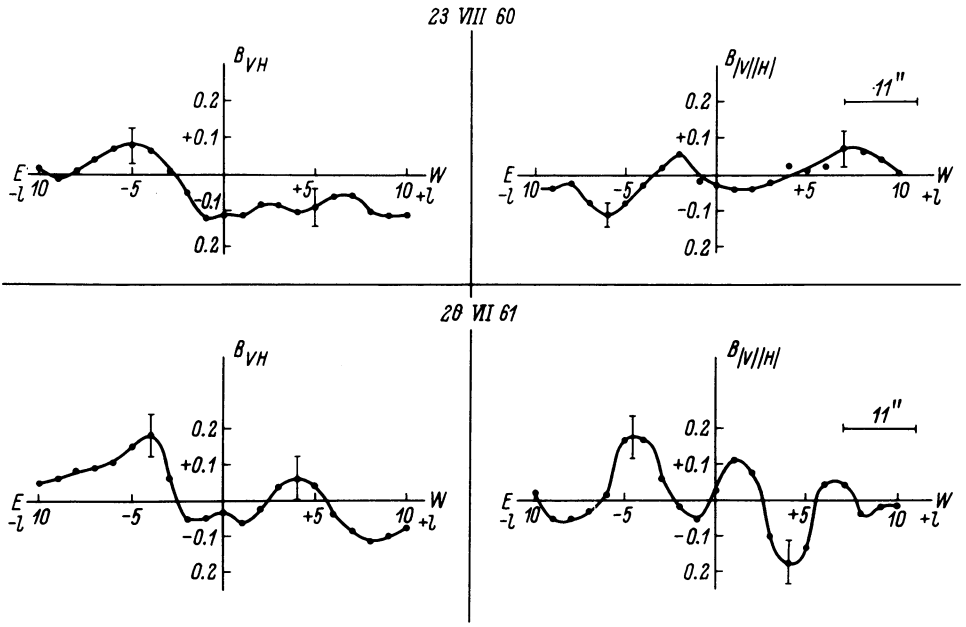

FIG. 1. *The cc-functions for the magnetic field recordings and velocity recordings, obtained in the undisturbed photosphere in Fe* I *5250.*

Kiepenheuer (ed.), Structure and Development of Solar Active Regions, 236–239.

The material obtained during 1960 and 1961 by means of the Pulkovo magnetograph in Fe I 5250 Å with a spatial resolution of 5″.5 × 2″.2 has been used for this purpose.

The cross-correlation functions between H and the intensity in Fe I 5250 (Figure 2)

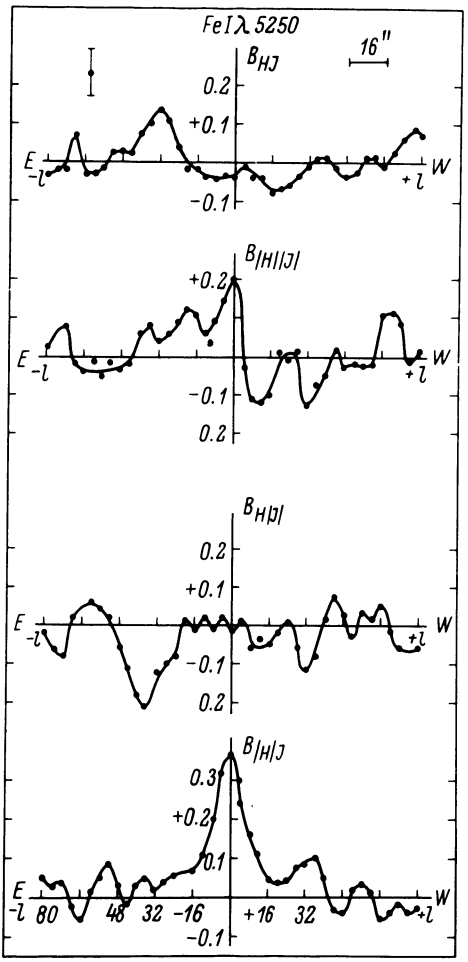

FIG. 2. *The cc-functions for the magnetic-field recordings and intensity-in-line recordings, obtained in the undisturbed photosphere in Fe I 5250.*

and in Ca I 6103 (Figure 3) have been computed on the base of the treatment of Crimean magnetic and intensity records, kindly offered to us by Professor A. B. Severny.

https://doi.org/10.1017/S0074180900021586 Published online by Cambridge University Press

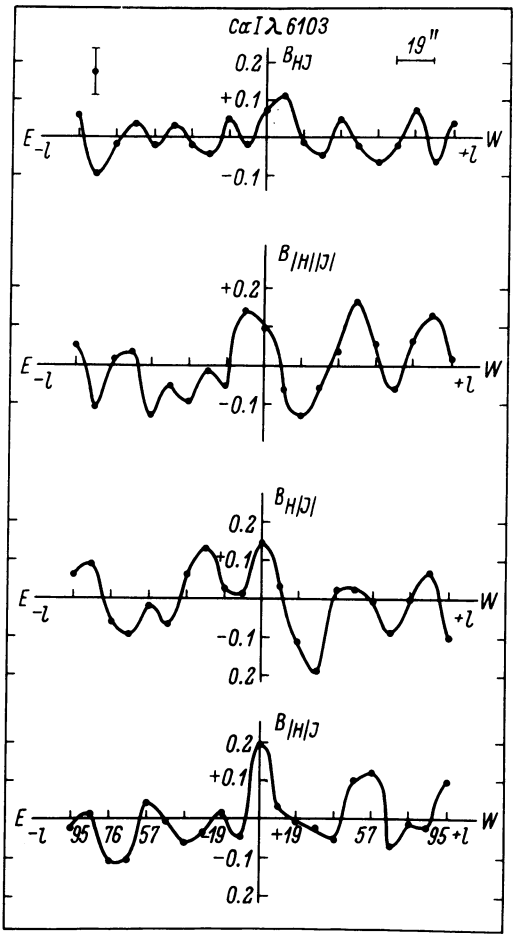

FIG. 3. *The cc-functions for the magnetic-field recordings and intensity-in-line recordings, obtained in the undisturbed photosphere in Ca* I *6103.*

2. Results

The cc-functions between H and V are low and asymmetric. For the $|V|\,|H|$-case cc-functions have a definite maximum and minimum with a change of the sign, when the lag is about equal to the radius of the supergranule.

This result means that the magnetic field at the centre of the supergranule seems to be connected with the velocity on the boundaries, and vice versa.

Besides, the change of the sign of the cc-functions indicates the different character of the velocity on the East and West sides of the magnetic hill.

The meaning of this asymmetry depends on the polarity and the magnetic-field strength. On the base of these results the mutual behavior of the magnetic elements

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of the background fields the same and the opposite, investigated by Bumba and Howard (1965) are proposed to be as a result of their dynamical interaction, but not a direct magnetic one.

The cc-functions between magnetic field and the brightness have nothing to do with those between magnetic field and velocity. They show maximum with lag equal to zero, which means the weakening of the lines at the points of the increasing magnetic field.

Thus, the locations of the places on the disk, where the brightness in lines and velocity are connected with the magnetic field, are not the same.

The lines Fe I 5250 and Ca I 6103 with different levels of formation at photosphere (the difference is about 160 km according to Severny, 1966) reveal the different correlation between brightness and magnetic field.

References

Bumba, V., Howard, R. (1965) *Astrophys. J.*, **141**, 1492.
Severny, A. B. (1966) *Astr. Zu.*, **43**, 465.