

INFERRING THE CHROMOSPHERIC MAGNETIC FIELD USING WAVES

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The aim of this work is to examine the hypothesis that the wave propagation time in the solar atmosphere can be used to infer the magnetic topography in the chromosphere as suggested recently by Finsterle et al. (2004). We do this by using an extension of our earlier 2-D MHD work on the interaction of acoustic waves with a flux tube. It is well known that these waves undergo mode transformation due to the presence of a magnetic field that is particularly effective at the surface of equipartition between magnetic and thermal energy density, the $\beta = 1$ surface. This transformation depends sensitively on the angle between the wave vector and the local field direction. At the $\beta = 1$ interface, the wave that enters the flux tube, (essentially the fast mode) has a higher phase speed than the incident acoustic wave. A time correlation between wave motions in the non-magnetic and magnetic regions could therefore provide a powerful diagnostic for mapping the magnetic field in the chromospheric network.

References

- [1] Finsterle, W., Jefferies, S. M., Cacciani, A. et al.2004, ApJ, 613, L185