

flow through the photosphere due to the random motions of magnetic footpoints. For existing coronal fields, helicity flow occurs when the rotation of an individual footpoint injects twist into the tube above, and also when the relative angular motions within a group of footpoints tangle the overlying fields. Helicity flow can also occur when new flux emerges already carrying helical structure. For both old and emerging flux, observations of the apparent transverse motions of photospheric field indicators can be used to measure the helicity flow.

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Session 6: Oscillations, Irradiance, Miscellaneous (Poster Session)

6.1

The Detection of Global (Giant Cell) Convective Wave Flows on the Sun

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The Stanford full-disk velocity maps from 1979 through 1984 have been examined for signatures of large-scale convective motions. Only intervals of nearly daily coverage were examined. East-west motions were examined by fitting the east-west component of velocity observed in a set of longitude intervals. Clear wave patterns with amplitudes of 50 to 100 m/s were found in zones near the equator. These flow patterns can be seen to move across the disk with solar rotation. A clean single peak in the power spectrum of east-west motions was found in one interval spanning 30 days. The flow patterns extend about 90 degrees in longitude. We interpret them as global (giant cell) convective wave flows.

6.2

Observations of Low-Degree P-Mode Oscillations in 1984

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Analysis of Stanford differential velocity observations has been extended through the 1984 observing season. Excellent quality observations were obtained on 38 days in a 49 day interval from the end of June through the beginning of August 1984. The p-mode spectrum has been examined for this data and improved frequency determinations have been made for modes of degree 3 through 6.

6.3

Comparison of the Differential Doppler Shift and Differential Radius Observations of Long Period Solar Oscillations

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It has been noted by Hill and Tash (1984) that the combination of the rotation of the sun and the observed temperature perturbations associated with long period normal modes can produce apparent velocities of a fraction of a m/sec in differential Doppler shift studies such as those made at the Crimean and Stanford observatories. Should this mechanism prove to be the primary source of velocity signals for the long period oscillations, the ratio of the amplitudes of the differential Doppler and differential radius observations is expected to be only a function of ℓ for $|m| > 1$. Ratios have been obtained using the Crimean (Kotov et al. 1983) and SCLERA observations, for 65 modes

belonging to 14 multiplets in the frequency range 80 to 120 μ Hz and $3 \leq \ell \leq 5$. These amplitude ratios are, in fact, observed to be characterized by a single parameter ℓ for $|m| \geq 1$. The multiplets are classified using this spatial information on ℓ and the spatial information relevant to m from differential radius observations. The rotational splittings for those 14 multiplets are consistent with those reported by Hill, Bos and Goode (1982).

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Hill, H. A., Bos, R. J., and Goode, P. R. 1982, Phys. Rev. Lett. 49, 1974.

Hill, H. A. and Tash, J. 1984, Bull. A.A.S., 16, 1000.

Kotov, V. A., Severny, A. B., Tsap, T. T., Moiseev, I. G., Efanov, V. A. and Nesterov, N. S., 1983, Sol Phys., 82, 9.

6.4

PRELIMINARY RESULTS FROM THE EXTREME LIMB PHOTOMETER 1982 AND 1983 OBSERVING SEASONS

J. Oseas and G. A. Chapman (SFO/CSU, Northridge)

The Extreme Limb Photometer (ELP) was used to observe active regions at the solar limb as well as across the disk. The limb observations are obtained with the ELP and the 28cm vacuum telescope pointed at the sun's center. Two apertures are used alternately that scan different amounts of the solar limb. These data are then converted into an effective solar oblateness signal for various active regions. The azimuthal step size is 3 arcsec. and the outer aperture scanned, approximately, the outer 11 arcsec. of the sun. This research was supported in part by grants from NASA and NSF.

6.5

Inversion Techniques for Helioseismology

W. Jeffrey, R. Rosner (Dept. of Astronomy, Harvard Univ.)

We present a detailed analysis of the stability, error estimation properties, and maximum resolution attainable in the inversion of the class of integral equations encountered in helioseismology when determining the radial differential rotation curve for the Sun. The various techniques examined include: Backus-Gilbert, Chahine (modified) nonlinear iterative, expansion of solutions in the kernel eigenvectors, maximum entropy, and Phillips-Twomey. The results of this analysis have specific applications to helioseismology, as well as to many other diverse indirect sensing experiments.

6.6

Full Disk Continuum Photometry with the NSO/Tucson Vacuum Telescope

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The recent repair of the NASA Solar Maximum Mission spacecraft has renewed interest in developing ground-based support for the onboard active cavity radiometer irradiance monitor (ACRIM). Previous attempts to correlate the ACRIM data with the passage of photospheric features across the disk as seen from ground-based, white-light images have lead to conflicting results. Either the ground-based data is not sufficiently accurate or errors have been made in the model assumptions (Sofia, Oster, and Schatten 1982, Solar Phys. 80, 87). Preliminary observations have been taken with the 60 cm Solar Vacuum Telescope and 512 channel diode array at the National Solar Observatory (NSO) in Tucson during the summer of 1984. Photoelectric scans with a 0.25 Å bandpass of the solar disk were made in a clean continuum region at 5256.3 Å. Observational procedures for obtaining the full disk continuum data and a trial program to improve accuracy are discussed. New software developed to reduce continuum data defines a limb and a center position of the disk so that each pixel can be assigned a value of $\mu (= \cos \theta)$. A histogram of intensity versus μ is generated for pixels of the undisturbed photosphere and