downward along a fluxtube. However, because of the critical conditions required for acoustic waves to couple to slow mode waves at a nonmagnetic-magnetic interface (Abdelatif 1989), this can not be an explanation for the large relative amount of energy absorption from p-mode waves by sunspots. This research was supported by NSF grant ATM-22366 and NASA grant NAGW-864.

16.05

The Enhanced Dissipation of Sound Waves in Sunspot and Plage Regions

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16.06

Long-Period Oscillations of the Chromospheric Network

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A time series of spectra, approximately one hour in duration, was obtained with the National Solar Observatory/ Sacramento Peak Vacuum Tower Telescope under conditions of very good seeing. The spectral regions around the Ca I and Ca II resonance lines at, respectively, 422.6 nm and 396.8 nm, were recorded with 0.25 s exposures, and with a narrow (0.5 arcsecond) slit. Analysis of the time series of line center Doppler shifts in the cell interiors reveal the familiar H_{2V} oscillatory power in the frequency range 4-8 mHz, with power extending to higher frequencies and with spatial average rms velocity of 1.5 km/s. The slit crossed a network feature, in which very little oscillatory power is present at those frequencies, but a strong low-frequency oscillation below 5 mHz is present with an rms velocity of 1.7 km/s. The oscillations in the chromospheric network as measured in the Ca II line show little phase coherence with Doppler shifts measured either in the Ca I resonance line or the weaker Fe I lines in the wing of the Ca II H-line. However, a much larger degree of phase coherence among these lines, extending to frequencies above 10 mHz is found in the cell interiors. These results suggest that the low frequency oscillations are confined to the chromosphere above the network, but that the H_{2V} phenomenon has a strong link to the velocity perturbations of the photosphere. Differences in phase of Doppler shift among the ten spectral lines observed allow them to be ordered with respect to height of formation, and permit estimates of the differences in actual formation heights.

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16.07

The K Line of Ca II in Chromospheric Bright Points

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Quasi-periodic oscillations of the intensities of the Ca II H and K lines on time scales of the order of 3 min, i.e., near the acoustic cutoff period, have been detected in several observations of chromospheric bright points (see e.g. Liu 1973, 1974, Cram 1974, Cram & Damé 1983, Damé 1984). These observations have in particular shown that the line profiles tend to present strong asymmetries between the blue and the red emission peaks. The line statistics show a predominance of profiles with K_{2v} enhancement with respect to those with K_{2r} enhancement and, moreover, the K_{2v} enhancement is typically accompanied by a red shift of K_3

Theoretical models that make use of short-period waves or of a chromospheric cavity have failed to account for such characteristics and, in particular, for the predominance of K_{2v} enhancement. As an answer to these difficulties, Durrant *et al.* (1976) and Bodo *et al.* (1990) proposed that the atmosphere might be excited by a pulse that is followed by a wake oscillating at the cut-off frequency.

We investigate here the properties of the propagation of such a pulse followed by its wake by integrating the non-linear hydrodynamic equations. From the distributions of the physical variables obtained in this way we compute profiles of the Ca II K line.

16.08

RECENT RESULTS OF THE SOLAR DISK SEXTANT EXPERIMENT

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The Solar Disk Sextant (SDS) is a space experiment designed to measure the size and shape of the Sun, and their variations. In developing the experiment, a balloon-borne version of the instrument was fabricated and flown several times in order to prove the validity of the experimental concept, and to refine the instrument. In addition, the balloon results will provide the first data points to establish a baseline of measurements with a length substantially beyond the timeframe of the space flight. This paper presents a summary of the results obtained during the last flight, which took place in Fort Sumner, NM, in October 1990. This work is being supported in part by NASA (The Solar Physics Branch, and the Radiation, Dynamics and Hydrology Branch), and in part by the US Air Force Office of Scientific Research.

16.09

The Solar Equatorial Internal Rotation Rate Estimated from Combined South Pole and NSO/Sac Peak Helioseismic Data Sets

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Estimates of the solar rotation rate as a function of depth have now been obtained from several different helioseismic data sets. While the results of applying different inversion techniques to the same data set agree at low spatial frequencies, there are systematic differences between the results of applying the same inversion technique to different data sets. For example, a local maximum exists near the surface in the equatorial rotation rate estimated from several d ta sets, but the depth at which this maximum occurs varies between the sets. The variations may be due at least partially to activity cycle effects on the modes, but different data analysis techniques probably also contribute. In addition, inversions of even the highest-quality data cannot yet distinguish between some qualitatively rather different rotation profiles. This situation will improve with the advent of the IRIS, GONG, and SOHO projects but, until data are available from these projects, it is useful to investigate alternative methods of improving the estimates.

Rotational splittings obtained from different helioseismic data sets can be combined to improve both the resolution and the range of estimates of the solar internal rotation rate. Here, we use both intermediate-degree data ($0 \leq \ell \leq 200$) obtained in 1981 and 1987 by the Bartol/NSO/NASA South Pole experiment, and high-degree data ($80 \leq \ell \leq 1000$) obtained in 1981 at NSO/Sac Peak. The splittings that are sensitive to the equatorial rotation rate are analyzed using a smoothness-constrained least-squares inversion technique. We discuss the effects of systematic differences between the data sets, and in particular investigate the question of the existence and location of the shallow m: ximum of the equatorial rotation rate.

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