infinite horizontal boundary at the photosphere in a way roughly representative of unpolar network. Magnetic topography is calculated as a function of horizontal position using the VAL model C reference atmosphere for the Cl 911 A, FeI 8688 A, and CaII 8542 A lines. Although much of the field remains vertical and concentrated in the network elements throughout the chromosphere, the cell “interiors” contain horizontal fields at all heights above the boundary. In contrast to thin flux tube models, these horizontal fields produce magnetograph simulations which compare reasonably well with observations of diffuse fields near the limb in the FeI 5018 A lines. However, the absence of such diffuse fields in the C-line data cannot be reproduced unless the boundary layer is raised. The results are compared with “canopy-type” models of chromospheric network and implications for both observing and modelling the magnetic and thermodynamic structure of the chromosphere are discussed.

J. W. Harvey (NSO/Tucson), W. Ditmiser (KNO)

Daily observations of solar magnetic fields made by the National Solar Observatory are processed to produce synoptic maps of each Carrington rotation. A sequence of these maps covering Carrington rotations 1622 to 1765 (1974 through 1984) was assembled onto a videocassette for viewing as a movie. In order of decreasing consciousness the following features have been noted. (1) Differential rotation at various latitudes dominates more subtle motions. Experiments to remove differential rotation are underway. (2) Active regions appear and disappear with a characteristic time scale comparable to or less than one rotation. Only a small fraction of magnetic flux leaves its site of appearance before vanishing. (3) The mean latitude of flux eruption decreases during the cycle but differently for the northern and southern hemispheres. (4) Background patterns of flux originate from large active regions. The background flux patterns appear to move toward the poles under the influence of a meridional flow. The background flux appears to rotate more slowly at a given latitude than active regions. (5) Complexes of activity are sustained by frequent emergence of active regions. These complexes seem to show a large-scale vertical motion which may be real but may simply be an illusion produced by differential rotation. (6) Activity seems to proceed in longitude in a series of large-scale waves but this may also be just a visual illusion.

The program of daily solar observations is supported in part by NOAA and NASA.

3.12 Solar Meridional Flow During 1982 - 1984
J. B. Zirker (NSO), R. F. Howard (NSO)

Labonte and Howard (Solar Physics 80, 361, 1982) reanalyzed solar rotation measurements made at Mt. Wilson from 1967 to 1980, and found marginal evidence for a poleward meridional flow (6 ± 4 km s⁻¹). Inflow in regions of strong magnetic fields tends to contaminate their estimate of meridional flow. In this paper, we exclude such high latitudes regions in an analysis of the high quality data of 1982 – 1984. A new estimate for meridional flow will be presented.

Session 4: Flares II and CMEs

4.1 Nonlocal Heat Transport in Flaring Solar Loops
D.F. Smith (Berkeley Research Associates)

Rapid heating in flaring magnetic loops leads to temperature gradients in which the mean free path of the fast tail electrons is considerably larger than the temperature scale height. This can lead to non-local heat transport, which has important effects for both the gross dynamics of heat conduction and the detailed structure of thermal convection fronts. Putting these results in our one-dimensional two-temperature single fluid code has yielded the following results. For gross dynamics it is adequate to use a local heat conduction model to emulate the non-local results of detailed Fokker-Planck calculations which depends on $\lambda_L$, where $\lambda_L$ is the mean free path of the slow thermal electrons. This result in conduction fronts which travel about five times the ion-sound speed $c_s$, considerably faster than in the case of fronts with anomalously limited conduction due to ion-acoustic instability of the return current which travel at about $c_s$. The rate of heating to attain a given temperature is similarly higher. However, the results are independent of the ratio of $\lambda_L/\tau$, to the extent that instabilities are not excited, where $\lambda_L$ and $\tau_L$ are the electron and ion temperatures, respectively, and give a heat flux which is considerably lower than the Spitzer-Harm value simply by using the correct physics. The implications of these results for dissipative thermal hard X-ray source models will be discussed. For the detailed structure of the conduction front a truly nonlocal algorithm must be used which involves smearng out the Spitzer-Harm heat flux. This results in a broader front due to the fast, nearly collisionless electrons streaming away from the top of the front, which deposit their energy beyond a normal Spitzer-Harm front width. This result has implications for such topics as QV emission.

4.2 Radiative Shocks in the Solar Flare Chromosphere
G. H. Fisher (Lawrence Livermore National Laboratory)

It was recently shown that flare heating by energetic electrons can produce thin, cool, and dense condensations moving downward in the flare chromosphere [1]. Similar "chromospheric condensations" have been produced in numerical simulations of "thermal" flare models [2].

A condensation moving downward at speeds of 50 to 100 km/sec must form behind a radiating shock, similar to the shock produced by supernaova remnants in the interstellar medium [3]. The temperature of the plasma immediately behind the shock front is in equilibrium with transition region temperatures. For a wide range of flare conditions, emission at a given temperature from the radiating shock will dominate that from the transition region.

Possible observational tests for radiative shocks in flares include their characteristic differential emission measure signature, temperature dependence of redshifts, and anomalously long lifetimes due to the changing flow velocity of material in the cooling portion of the radiating shock.

References:

*Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

4.3 The Importance of Proton Beam Pressure in Solar Flares
D.H. Tenney, R.C. Canfield, A.N. McClintock (USCD)

Nonthermal electron beams have long been proposed as a flare heating mechanism, but momentum deposition by the beam has been consistently overlooked (Brown and Craig, Astron. Astrophys., 130, 15, 1984). Brown and Craig find this to be a

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