structures. We also find that static energy balance models are not consistent with cool "spiky" structures observed above sunspots. We suggest mass flows or boundary conditions at the loop footpoints different from those assumed in the model as possible causes of the discrepancy.

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Magnetic field data for solar active regions 2372 and 2370, obtained by the Marshall Space Flight Center Real-Time Solar Magnetograph, were analyzed for the period April 4-11, 1980. The longitudinal component of the magnetic field was contoured, the data filtered, and then analyzed to reveal areas of magnetic classification G by comparison with contoured longitudinal intensity plots. The transverse component of the field was contoured, plotted and azimuth plots were generated. For areas determined to be of class G, the transverse data were analyzed and the strength and configuration obtained. The azimuth angle with respect to the neutral line was measured and interpreted as a measure of the shear in the transverse component. Analysis of the azimuth angle in the regions of class G showed these areas to have large shears, with local transverse field strengths (as Z polar-ization) ranging from 0.5 to 4.0. The longitudinal field was found to dominate in these areas by a factor of approximately 2:1. Many of the 59 flares in region 2372 have been determined to be located at or near these areas, indicating a possible relationship between the shear and flare production.

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F.7A Spicules and Coronal Heating: A Unified View. J. V. HOLLING, Dept. of Physics, Univ. of New Hampshire, Durham, NH 03824 - We investigate the nonlinear behavior of propagating axisymmetric twists on axisymmetric solar magnetic flux tubes. The twists are assumed to be generated in the convection zone. The flux tubes are open, with $B_j = 1500$G in the photosphere, expanding to $B_j \approx 100$ in the corona. The atmosphere in the flux tube consists of a cool isothermal chromosphere and a hot isothermal corona, separated by a contact surface (the transition region). Principal results are: 1) The Lorentz and centrifugal forces associated with the twists nonlinearly drive upward motions of the upper chromosphere and transition region. The densities, density profiles, upward velocities, and heights reached all agree well with observed spicule parameters. The theoretical structures are cooler than observed spicules; however, they may merely be a consequence of our neglect of dissipation. 2) Twists with periods less than a few minutes and photospheric velocities in excess of 1 km s$^{-1}$ steepen to form fast/slow shocks in the chromosphere. The fast shocks enter the corona. Their subsequent evolution in the corona has not been followed, but we presume that they disperse there and heat the corona. 3) When fast shocks hit the transition region from below, they result in transverse (to $B_j$) velocity pulses (lifetime = tens of seconds) of 60-100 km s$^{-1}$ amplitude. These pulses may correspond to the bursts of Doppler shift in the transition region reported by Brueckner, if $B_j$ is sufficiently transverse to the line-of-sight. Brueckner's observations may be a signature of fast shocks entering the corona from below. 4) Our results demonstrate that mass motions may be an inevitable consequence of an MHD energy flux into the corona. We therefore suggest that future work should view spicules and coronal heating in a unified way.

F.7B A Radiative Transfer Model of Filamentary Prominences. F.L. Bormann, Joint Institute for Laboratory Astrophysics, University of Colorado and M. Nibalski, Sacramento Peak Observatory - Previous models of quiescent solar prominences consider an infinite slab of gas. We are considering the effect of vertical tubes of enhanced density within the infinite slab model. The use of escape probability techniques for this geometry will be discussed. We consider the effects of the ionizing UV chromospheric and coronal radiation on a pure hydrogen gas. The hydrogen atom is modelled by five levels plus continuum. We plan to compare the calculated hydrogen line intensities with the observations of Landman et al.

F.8 Mechanical Heating of the Solar Corona. D.L. ROOK, Naval Res. Lab. - The high temperatures measured in the solar corona are explained in terms of heating which results from the work done on the plasma by expanding magnetic flux. This theory, which invokes no wave deposition or ohmic heating processes, is consistent with the strongly magnetized, highly variable nature of the solar atmosphere. The critical observational information required to test the theory is a measurement of the magnetic field in regions where material is transported upward through the chromosphere. Estimates made using available data indicate that if such fields are -20 G and are aligned at an angle to the flow field, less than 0.1 per cent of the total area covered by bipolar magnetic regions needs to be releasing flux to maintain observed coronal temperatures. This work was supported by the NASA Terrestrial Theory Program and the Office of Naval Research.

F.9 Generation of Coronal Electric Currents due to Convective Motions on the Photosphere. T. SAKURAI and R.H. LEVINE, CTA. Generation of electric currents in a magnetized plasma overlaying a dense convective layer is studied, assuming that the magnetic field perturbation is small and satisfies the force-free equation. Currents are produced by rotational motions on the boundary in the case of a uniform equilibrium field. In a simple two-dimensional bipolar configuration, however, both rotational and incompressible motions give rise to currents and the current density has a peak at the magnetic neutral line. Scaling laws for the current density as well as for the stored magnetic energy...