ABSTRACTS

F.3 A Dynamic Flux-Tube Model for Compressible MHD Processes in the Solar Atmosphere, J.P. BORIS, J.T. MARISKA, D.L. BOOK, E.S. ORAN, T. YOUNG, and G.A. DORSCHER, Naval Res. Lab. - In the solar atmosphere the fluid and magnetic pressures vary over a very wide range in both space and time. Thus the plasma may be controlled by fluid dynamic effects, magnetic field effects, or both equally, depending on how the local conditions change in time. A new model which is a generalization of fixed magnetic field models has been developed to describe wave and heat-transfer phenomena in the solar atmosphere and corona. In this model a locally axisymmetric flux tube is represented by the complete nonlinear MHD equations fully resolved in the axial direction but integrated over an assumed but time-varying similarity-like radial profile. The resulting set of equations thus depends on only one spatial variable but represents the full set of seven non-linear MHD equations for magnetosonic waves, Alfvén waves, acoustic waves, and fluid dynamic shocks. The model is being used for dynamic studies of the solar corona, transition layer, plasma jets, and the effects of compression, Ohmic, and wave heating mechanisms on the solar atmosphere. To facilitate comparisons with observations, a time-dependent description of the non-equilibrium ionization of oxygen has been included which is calculated along with the evolving MHD flow. Tests of the model for the various ideal wave systems have been performed as benchmark calculations and will be reported. This work was supported by the NASA Solar Terrestrial Theory Program and the Office of Naval Research.

F.5 Analysis and Interpretation of EUV Emission from Solar Active Regions, Dore, K.P., Naval Research Lab - Data obtained by the NRL High Resolution Telescope and Spectrograph (HRTS) and the HCO OSO-VI EUV spectroholograph have been analyzed. From the OSO-VI data the differential emission measure of an active region transition zone and corona are obtained. From the HRTS data, the differential emission measure, pressure and flow velocities in the transition zone are obtained. Downflows are observed throughout the plage regions with typical values of 8 kmps at 10^5 K and lower velocities at higher and lower temperature. In the sunspots, downflows of 0 to 150 kmps are found with the supersonic flows co-spatial with regions of subsolar flow. These results are analyzed in terms of a steady energy balance model and a steady flow model. Neither model is able to predict the structure of the lower transition zone. Both models when compared with the observed differential emission measure and the flow velocities as a function of temperature predict that the cross-sectional area of an active region flux tube must diverge rapidly with height in the transition zone. Only an average value can be derived for any coronal heating.

F.6A Transition Region and Coronas in Solar Active Regions: Observations and Numerical Modeling, L. GOLUB, R. PALLAVICINI, G. PERES, R. ROSNER, S. SERRO, and G.S. VAIANA, CTA. We have analyzed X-ray, EUV and centimeter observations of active region McMath 12512 on September 3, 1973 for comparison with static models of magnetically confined coronal loops. The XUV observations are from the HCO and AS&AE experiments on board Skylab, and the radio observations are from Stanford University. The loop model adopted is based on energy balance and hydrostatic equilibrium and takes into account effects such as variable loop cross-section and heating scale-height. We find that the model is able to reproduce satisfactorily the observed properties in the upper transition region and coronal portion of loop structures, for a large variety of loops ranging from compact, high-pressure loops in the core of the region to more extended, fainter loops interconnecting McMath 12512 with adjacent active regions. We find some discrepancy between model predictions and observations for the lower transition region portion of loop