22.05 Solar Transition Region Response to Heating Rate Variations, E.S. OREN, J.T. MARISKA, J.P. BORIS, T.R. YOUNG, and G.A. DUCHEK, Laboratory for Computational Physics and R.O. Helmholtz Center for Space Research, NRL.

The structure of the solar chromosphere-corona transition region is primarily determined by a balance between local radiative losses and the energy provided by thermal conduction from the corona. The coronal heat source can therefore result in readjustments in density and temperature in both the transition region and the overlying corona. In addition the chromosphere is dynamically coupled to the overlying atmospheric layers and to structures involved in any readjustments. We examine the response of the coupled chromosphere, transition region, and corona to variations in the heating by using a numerical model of these atmospheric layers. The simulations show that the atmosphere responds to both increases and decreases in a spatially uniform energy deposition by smoothly readjusting both the temperature gradient and the amount of material in the region of peak radiating efficiency. Throughout this process the transition region maintains a thin laminar structure. The spectroscopic consequences of these readjustments can be large, however, and the results of both heating and cooling will be discussed in this context.

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22.06 Mass Flows in the Solar Corona as a Diagnostic of the Coronal Heating Function, J.T. MARISKA and J.P. BORIS, E.O. Hulbert Center for Space Research and Laboratory for Computational Physics, NRL.

Using a simple theory and numerical simulations we show that the systematic flow of plasma along a coronal magnetic flux tube is easily produced by asymmetric heating. For small degrees of asymmetry the velocity of the flow is proportional to the heating asymmetry and is directed to the side of the loop away from the bulk of the energy deposition. For larger degrees of asymmetry the flow saturates at the velocity necessary to redistribute the energy evenly via the enthalpy flux. In this model velocity measurements in the solar transition region represent a first order diagnostic of coronal heating and observations of downflows in the chromospheric network support the idea that the heating of coronal magnetic loops occurs away from the bright network elements.

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