



TWO DIMENSIONAL MHD MODELS OF THE SOLAR CORONA; MASS LOSS FROM THE STREAMER BELT

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The equations of magneto-hydrodynamics (MHD) are used to study an axially symmetric model of the large scale solar corona, extending from the coronal base to 15 solar radii. We use a uniform heating of the inner corona to investigate the energy output when the magnetic field is given as a dipole at the coronal base. The heat input produces a large scale magnetic field structure similar to that found by Pneuman and Kopp (1971) with coronal holes in the polar regions and a helmet streamer around the equator. We pay special attention to the energy balance in the system, and find that the role of heat conduction is important in determining the thermal structure in magnetically closed regions. Insufficient energy loss to the transition region, associated with heating of coronal ions, leads to a high temperature inside the streamer. In the coronal holes the super-sonic solar wind is the dominating energy loss, and the temperature is lower. As the difference in pressure scale height along open and closed flux tubes is large the streamer-coronal hole system does not relax to a steady-state when the MHD equations are integrated on relatively long time scales; the streamer opens periodically to eject massive plasmoids into interplanetary space. These plasmoids contribute significantly to the mass and energy flux in the solar wind.