ABSTRACTS

D.16 A Three-Coronograph Record from 1 to 10 Rs of the Energetics of a Corona Transient - W. J. Wagner, C. Sawyer, R. M. E. Illing, L. L. House, and C. W. Querfeld, HAO/NACAR; N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen, B. J. Michels, NRL; and R. N. Smartt, SMPS The advantages of multi-telescope observations of a coronal transient are demonstrated by a presentation of simultaneous data from the Solar Maximum Mission Coronagraphs and/or the HAO's Neutral Line Monitor. The combination of high time-resolution data from these two instruments gives a detailed view of the transient event. The magnitude of the flare energy release is determined to be about 10^34 ergs. This value is in agreement with theoretical expectations. The time variation of the energy release is also discussed.

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A non-plane, time-dependent, two-dimensional MHD analysis has been used to examine the evolution of the magnetic field and the conversion of different modes of energy after the onset of a flare. The results illustrate that if the initial magnetic field is a potential field, the evolution remains in meridional plane, while with a force-free field the evolution exhibits twisting of field lines. Associated with these, it is found that the rate of generation of the kinetic energy is larger in the force-free field than in a potential field. In other words, the resultant coronal transients with an initial force-free field propagate faster than with an initial potential field. Further, it is shown that some of the observed structures associated with the coronal transients can be interpreted in terms of the evolution of locally twisted field lines. This work is supported by NSF Grant ATM77-22484.

D.19 ERUPTIVE SOLAR MAGNETIC FIELDS - B. G. Low, HAO, NAIR. An exact theoretical calculation is presented for the static equilibrium of a loop shaped solar current sheet enclosing an isolated bipolar magnetic arcade in an isothermal stratified atmosphere. The equilibria for increasingly large baseline lengths have the field extending to greater heights. Critical baseline lengths, determined by the total magnetic flux of the arcade, exist such that when exceeded, no equilibrium is available to the system. The non-equilibrium can result in two ways. The first is the appearance of an unstable configuration and the presence of gravity is not important. The effect is basically the already encountered and nonlinear force-free magnetic fields. The second loss of equilibrium is due to magnetic buoyancy and takes place with the bipolar magnetic field rising upward. It is suggested that the latter effect plays dominant role in triggering coronal transients. The initiation of a coronal transient would then be in the form of a low density arch system rising through the low coronas. The low density region would appear dark in scattered light and should be distinguished from the bright coronal transient in the later fully developed dynamical state observed high in the upper corona.

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