search of flare position using mhd simulation and comparing with x-ray observations

A.I. Podgorny, \*I.M. Podgorny

Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia,  
 [podgorny@lebedev.ru](mailto:podgorny@lebedev.ru)  
\*Institute of Astronomy of the Russian Academy of Sciences, Moscow, Russia,  
 [podgorny@inasan.ru](mailto:podgorny@inasan.ru)

To explain primordial energy release of solar flare situated high in the corona (~ 20 000 km) above an active region the several mechanisms of solar flare production are considered by different authors. Usually the initial conditions are artificially set such a way that it is required for development of the proposed mechanism. The flare mechanism should be found directly from the numerical MHD simulations in which all conditions are taken from observations. Such simulations show that flare energy accumulation can occur in the current sheet magnetic field created by disturbances focusing in the vicinity of an X-type singular line. Other considered flare mechanisms require appropriate conditions which is impossible to obtain by slow magnetic field evolution, which is observed on solar surface. The electrodynamical model of the solar flare based on current sheet mechanism, which explains the flare manifestations, has been developed. Using this electrodynamical model the positions of sources of X-ray radiation can be found, if the magnetic field configuration is known from results of MHD simulations. To find positions of sources of soft X-ray in the corona the graphical system developed by authors is used. Comparison with RHESSI X-ray observations permit to find the position of the current sheet which can produce thermal X-ray emission for flare. The flare occurred May 27, 2003 at 02:40 is investigated. The figure shows the magnetic field lines according to three-dimensional numerical MHD simulation. The circle shows location of the current density maximum in the current sheet. Right – the SOHO MDI magnetogram and lines of the equal intensity of the thermal X-ray during the flare according RHESSI measurements are demonstrated. The projection of the current density maximum on the Sun surface is also shown.

