M33a Coronal MHD shock-prominence interaction

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Flare-associated coronal shock waves propagate globally in the solar corona and sometimes interact with solar prominence far from the flaring active region, leading to large amplitude prominence oscillations. Such shock-prominence interactions are the only phenomena where we can follow the time evolution of shock-cloud interaction in cosmic plasmas. Coronal shock-prominence interactions share lots of common features with interstellar medium (ISM) shock-molecular cloud (MC) interactions, which has long been discussed as one of the most basic problems in interstellar gas dynamics. In the talk, we discuss how coronal shock momentum is transferred to the prominence with the help of 3D MHD numerical simulation of shock-prominence interactions. We also construct a phenomenological model of the prominence acceleration by shock injection and compare it with the simulation results. We found that the magnetic tension force plays the most important role in accelerating the prominence, while the fluid drag force, which is important in accelerating MC shocked by ISM shock, does not play the leading role in prominence acceleration. Also, the coronal shock excites chaotic flow inside the prominence, which damps in an exponential manner with the help of Lorentz force. The solar corona is full of MHD waves excited by photospheric movement and small scale magnetic explosion in the solar corona (nano-flares). We discuss possible roles of wave-prominence interactions in exciting small amplitude oscillations and chaotic flows within the prominence which are recently studied vigorously with the help of high resolution observations such as by *Hinode* and *SDO*.