Theoretical study of two-ribbon flares associated with coronal mass ejections

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Abstract

The main goal of this investigation is to develop a model to explain the cause of the solar eruptions and the physical features observed during the evolution of a solar eruption. We consider a two-step process suggested by Low (1990) in our solar eruption model. We use the two-step scenario to explain the physical features of CME/flare association during the solar eruption process. The first step of the two-step process is to open the partially closed magnetic field of a streamer. We add a radial velocity and thermal pressure at the solar surface to blow open the partially close field lines of the streamer. This process is an ideal MHD one, but the second process is a resistive MHD process. We add dissipation and diffusion to trigger the magnetic reconnection, which releases magnetic energy to kinetic energy. The intense heating at the magnetic diffusion region can be transported down to the foot points to form a two-ribbon flare.