M36a An Emerging Flux Trigger Mechanism for Coronal Mass Ejections

Chen, P. F.(南京大)、 ○柴田 一成 (京大理)

Observations indicate that reconnection-favored emerging flux has a strong correlation with CMEs. Motivated by this observed correlation and based on the flux rope model, an emerging flux trigger mechanism is proposed for the onset of CMEs, using two-dimensional magnetohydrodynamic (MHD) numerical simulations: when such emerging flux emerges within the filament channel, it cancels the magnetic field below the flux rope or reconnects with the two-sided field lines (left and right to the magnetic neutral line), leading to the rise of the flux rope (due to loss of equilibrium) and the formation of a current sheet below it; similar global restructuring and resulting rise motion of the flux rope occur also when reconnection-favored emerging flux appears on the outer edge of the filament channel. In either case, fast magnetic reconnection in the current sheet below the flux rope induces fast ejection of the flux rope (i.e., CME). It is also shown that the reconnection-unfavored emerging flux, either within the filament channel or on the outer edge of the channel, makes the flux rope move down, i.e., no CMEs can be triggered. Although the present 2D model can not provide many details of the largely-unknown 3D processes associated with prominence eruptions, it really shows some observational features such as the height-time profile of erupting prominences. The most important is that our model can well explain the observed correlation between CMEs and the reconnection-favored emerging flux.[1)]

1) Chen, P. F. and Shibata, K. 2000, ApJ, in press.