# CME ONSET AND TAKE-OFF

S. K. Antiochos (NASA/GSFC)
J. T. Karpen (NASA/GSFC)
C.R. DeVore (NRL)

For understanding and eventually predicting coronal mass ejections/eruptive flares, two critical questions must be answered: What is the mechanism for eruption onset, and what is the mechanism for the rapid acceleration? We address these questions in the context of the breakout model using 2.5D MHD simulations with adaptive mesh refinement (AMR). The AMR capability allowed us to achieve ultra-high numerical resolution and, thereby, determine the influence of the effective Lundquist number on the eruption. Our calculations show that, at least, for the breakout model, the onset of reconnection external to the highly sheared filament channel is the onset mechanism. Once this reconnection turns on, eruption is inevitable. However, as long as this is the only reconnection in the system, the eruption remains slow. We find that the eruption undergoes an abrupt "take-off" when the flare reconnection below the erupting plasmoid develops significant reconnection jets. We conclude that in fast CMEs, flare reconnection is the primary mechanism responsible for both flare heating and CME acceleration. We discuss the implications of these results for SDO observations and describe possible tests of the model.

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