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Impulsive Magnetic Reconnection in CME Acceleration and Flare Non-Thermal Emission

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Resistive MHD imulations with nonuniform anomalous resistivity and have shown that CME (or Flux rope) acceleration and flare non-thermal emission are caused by impulsive magnetic reconnection during the flare rise phase. We discuss the role of nonuniform anomalous resistivity on the time scale of flux rope acceleration and reconnection rate. Our simulation results show that the reconnection electric field reaches a peak value of O(1 keV/m) in the reconnecting current sheet for X-class flares during the flare rise phase, which is consistent with estimates obtained from several observations of two ribbon expansion in flare-CME events. Our simulations provide quantitative agreement with observations of CME acceleration during the flare rise phase and predict an enhanced magnetic reconnection rate during this period. We will discuss the physical scenario of how the phenomenological anomalous resistivity can be created in collisionless turbulent plasmas in the current sheet, how the current sheet can be significantly wider than the ion skin depth, and how particles are accelerated in the globally evolving EM fields with turbulence in the current sheet.