Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Global stability versus diffusion region micro-physics in flare reconnection during CME formation[1] VYACHESLAV S. LUKIN, ED LEE, MARK G. LINTON, Naval Research Laboratory — A model of coronal mass ejection (CME) initiation and flare magnetic reconnection is implemented within the HiFi framework with different combinations of initial conditions governing the magnetic equilibrium and gravitational stratification of the atmosphere. The model's sensitivity to the initial conditions and reconnection micro-physics is then investigated by a systematic parameter study. We find that the initial equilibrium, which includes a pre-existing magnetic flux rope located above a magnetic X-point, can be unstable to the X-point collapse due to wave accumulation there. However, introduction of an overall guide field allows small-amplitude waves to pass through the X-point and stabilize the equilibrium. Simulations of magnetic flux emergence via photospheric boundary driving demonstrate the impact of the guide field on the dynamics of resulting eruptions. In particular, we find that the rate of flare reconnection and the speed of the CME can be determined by the magnitude of the guide field irrespective of the micro-physics of magnetic reconnection. In a stratified atmosphere, we also identify a novel mechanism for producing quasi-periodic behavior at the flare reconnection site as a possible explanation of similar phenomena observed in solar and stellar flares.

[1]This work was supported by NASA SR&T and ONR 6.1.

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Date submitted: 11 Jul 2014 Electronic form version 1.4