(3) CME-ICME connection

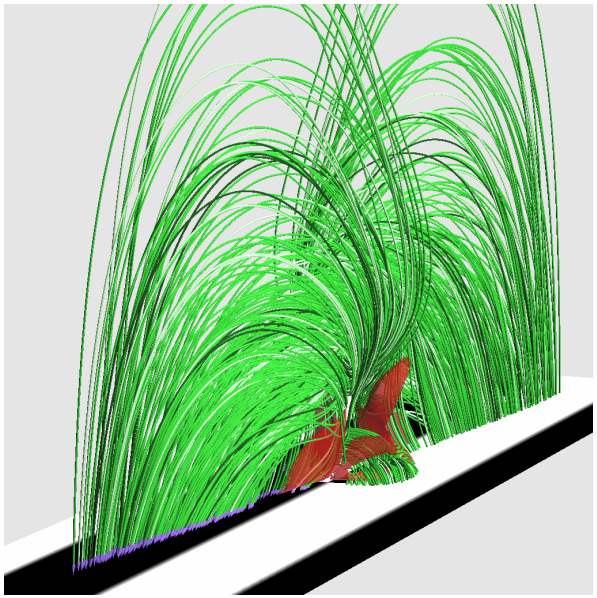
Advanced modeling for solar eruption and CME has been developed in CAWSES-II program

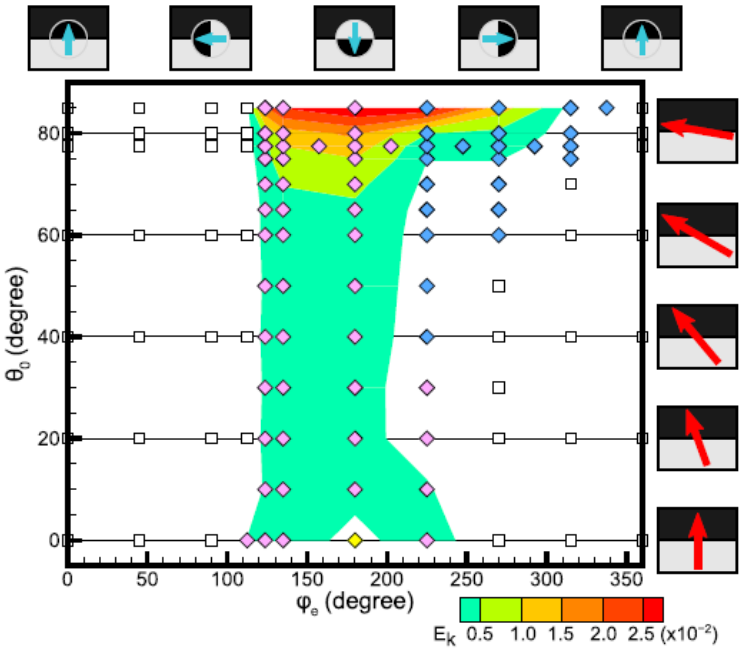
- “Magnetic field structures triggering solar flares and coronal mass ejections” Kusano et al. 2012 The Astrophysical Journal, Volume 760, Issue 1, article id 31. 9 pp.
- “Evolution of Coronal Mass Ejection Morphology with Increasing Heliocentric Distance” Savani et al., 2010, The Astrophysical Journal, Vol. 731, issue 2, article 109, DOI: 10.1088/0004-637X/731/2/109
- “MHD modeling for Formation Process of Coronal Mass Ejections: Interaction between Ejecting Flux Rope and Ambient Field” Shiota et al. 2010/08, The Astrophysical Journal, 718, 2, 1305-1314
- “Three-dimensional MHD modeling of the solar wind structures associated with 13 December 2006 coronal mass ejection”, Kataoka et al. 2009, Journal of Geophysical Research (Space Physics), 114, 10102

Magnetic field structures triggering solar flares and coronal mass ejections, K. Kusano, Y. Bamba, T. Yamamoto, Y. Iida, S. Toriumi, A. Asai, The Astrophysical Journal, Volume 760, Issue 1, article id 31. 9 pp. (11/2012).

Magnetic field structure triggering solar eruption is systematically surveyed by ensemble numerical simulation of three-dimensional magnetohydrodynamic model. As a result, it was determined that two different types of small magnetic structures favor the onset of solar eruptions. These structures were indeed observed to be in flaring active regions by Hinode sattelite.

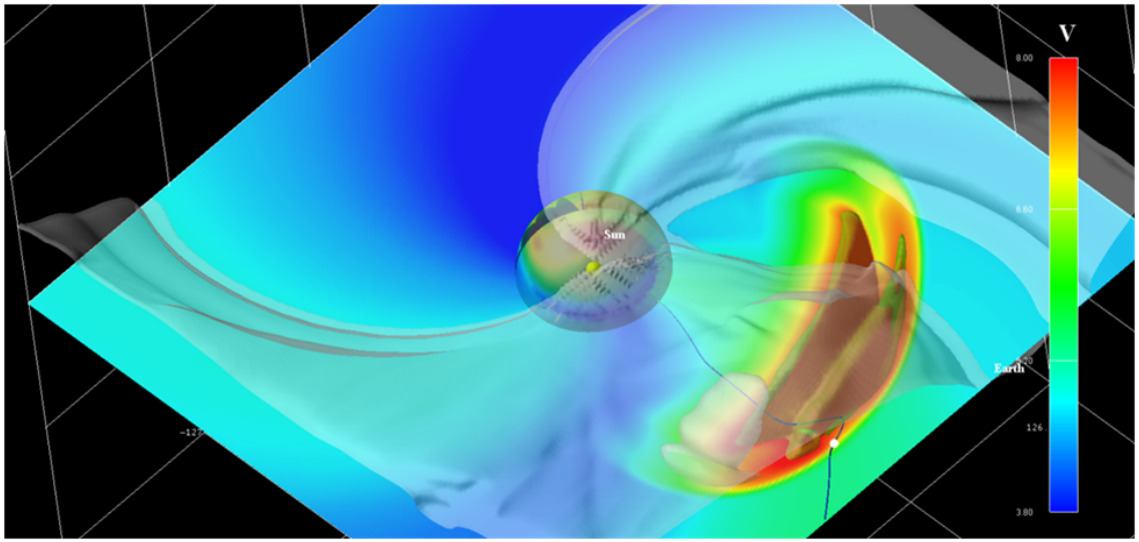
Simulation Results (left) 3D view of erupting flux tube (right) flare phase diagram. Color indicates the intensity of flare in a parameter space for magnetic structures.





"Three-dimensional MHD modeling of the solar wind structures associated with 13 December 2006 coronal mass ejection", Kataoka, R., Ebisuzaki, T., Kusano, K., Shiota, D., Inoue, S., Yamamoto, T.T., Tokumaru, M., 2009, Journal of Geophysical Research (Space Physics), 114, 10102.

A 3-D magnetohydrodynamic (MHD) simulation is performed to reconstruct the interplanetary propagation of a coronal mass ejection (CME) that occurred on 13 December 2006. It was shown that the simple solar wind model is topologically complex enough to be consistent with in situ observations, such as southward IMF associated with CMEs.



3D MHD simulation for CME propagation in the interplanetary space