August 2000

Title: *Magnetic Configuration to Support Solar Prominences*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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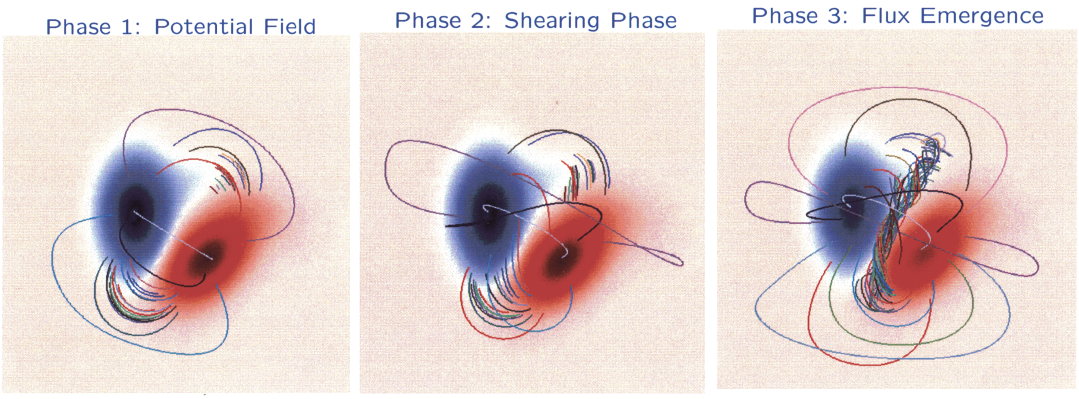
- **Process for supporting solar prominence material successfully modeled.**

MHD modeling has shown that twisted magnetic flux tubes (i.e., flux ropes) have the potential to support dense and cool prominence material against gravity. Opposite polarity magnetic flux emerging from the Sun in a sheared magnetic configuration can lead to the formation of a flux rope. Solution of hydrodynamic equations along the flux-rope field lines demonstrates that the flux rope can support the dense, cold material associated with prominences. An MHD simulation was used to model a prominence observed on Sept 23, 1996. Kitt Peak magnetogram observations were used as a guide in specifying the boundary conditions at the base of the corona.

Resolving this piece of the puzzle of the coronal dynamics is needed for complete understanding and prediction of the influence of the Sun and its activity on the inner heliosphere, a central goal of the Sun-Earth Connections theme. This MHD model, and other related models, which can simulate the solar atmosphere from the top of the chromosphere, out into the solar corona and inner heliosphere, to Earth and beyond, were developed with support from the SPTP and SECTP programs. These codes required tens of man-years of effort for development and could not be developed within any other NASA program.



Primary publication: Amari T., Luciani, J. F., Mikic, Z., and Linker, J. A., "Three-Dimensional Solutions of Magnetohydrodynamic Equations for Prominence Magnetic Support: Twisted Magnetic Flux Rope, *The Astrophysical Journal*, **518**, L57-L60, 1999.