

Multispacecraft modeling of ICMEs and their connections to solar sources

Q. Hu (1), B. Dasgupta (1) and J. Qiu (2)

(1) Institute of Geophysics and Planetary Physics, University of California, Riverside, CA 92521, USA, (2) Department of Physics, Montana State University, Bozeman, MT 59717, USA (qiang.hu@ucr.edu)

The Corona Mass Ejections (CMEs) are commonly modeled as magnetic flux ropes. The interplanetary counterparts of CMEs, the ICMEs, detected in-situ by spacecraft ACE, Wind, and Ulysses, etc, have been examined by various means. In particular, we present the Grad-Shafranov (GS) reconstruction technique based on magnetohydrostatic theory that is capable of deriving 2 1/2 dimensional cross section of a non-axisymmetric cylindrical flux rope from single-spacecraft multi-instrument measurements. In addition, emphases have been put on utilizing multipoint observations of the single event, whenever possible, to examine the longitudinal or latitudinal configuration of the structure. Physical properties, including but not limited to the electric current, magnetic flux, and the relative magnetic helicity, can be obtained. We will compare certain physical quantities of ICMEs, such as the magnetic flux content, with that in their corresponding solar source regions. The implications of the results on CME eruption models will be discussed. Attempt to derive a three-dimensional model based on a theory of dissipative relaxed states will be pursued.