

Determination of Flux rope axis for GS reconstruction from MDD method

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It is important to give the orientation of the axis(z) of the magnetic flux ropes before employing Grad-Shafranov reconstruction. The ability of two method MVAB from single-spacecraft data and MDD from four-spacecraft data in finding axis are tested using the analytical flux rope solutions. It found that the M direction is close to the axial direction in case of crossings near the flux rope's center. The N direction is more close to the axial direction for the edge crossings. For some certain path-center distance crossings, either M or N could be the axis direction. The accuracy of the axial direction given by MDD only depends on the relative satellite spacing to the size of the flux rope. When the maximum distance is less than the flux rope radius, the axial direction can be given accurately, and it is not affected by the crossing path. A practical example under MVAB failure is reconstructed, which shows the importance of the MDD method.