Reconstruction of the magnetic structure using quadratic splines along the spacecraft trajector

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Abstract

Polynomial reconstruction is a technique to reconstruct the magnetic field in the vicinity of multiple spacecraft using magnetic field and current density measurements in order to find a 3D quadratic or approximately quadratic representation of the magnetic field. Here we implement quadratic splines interpolation along the spacecraft trajectory so as not to be constrained to a simple quadratic expansion over all space. This allows us to reconstruct the magnetic field within a region expanded along the spacecraft trajectory, and can in principle represent arbitrary variation in that direction. This technique can be useful if the velocity of the spacecraft relative to the magnetic structure is relatively constant. If that velocity varies greatly, the polynomial expansion without splines will probably work better.

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