



Multi-spacecraft methods for determining spatial gradients

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The reliable computation of gradients from multi-point measurements is often difficult because it requires very precise data, i.e. an inherent high precision of the measurements, as well as a good intercalibration. Other difficulties may arise from the limited number of measurement points, their geometrical configuration, and a possible mismatch between the spatial scales of the structure under study and the spacecraft separation. These difficulties explain why, for instance, there have not been many studies of Cluster data that compute gradients, except those that deal with the highly accurate magnetic field measurements. We present novel techniques to address these problems, techniques that allow the computation of spatial gradients when the traditional constraints no longer apply: more or less than 4 measurement points, degenerate measurement point topology, differences between spacecraft separation and physical scales.