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Computing gradients from multi-point data: recent progress

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This contribution addresses the problem of reliably computing gradients from multi-point data. A major obstacle for computing gradients from multi-spacecraft data is the influence of both random and systematic errors, the presence of structure at multiple scales, and the need to satisfy the homogeneity condition. In this contribution we describe a robust approach to computing gradients using a least-squares method. We compute gradients of scalar and vector quantities, together with all-inclusive error estimates. We discuss some recent advances, such as an adaptive technique to determine the homogeneity scale and the approximation error at each point, which leads to more precise gradients and better error estimates. We apply the method to Cluster observations in the plasmasphere.