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# The Use of Radius of Curvature of the Magnetic Field for Identifying and Characterizing the Neutral Line on the Earth's Magnetopause

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## Abstract

An early concept of the fundamental process associated with the reconnection of magnetic fields (from one topographical relationship to another) was that reconnection was initiated when electrons could no longer be guided by the magnetic field. This occurs when the radius of curvature of the magnetic field decreases and approaches the electron gyroradius. This concept differs from that of the electron diffusion region, which was devised to speed up diffusive reconnection by making the diffusion region smaller. In this paper we use the radius of curvature to identify quantitatively the proximity of the x-point. This study shows both the time stationarity of the x-point itself and the time-stationary existence of the x-line along the magnetopause. The x-point exhibits very large gradients even on the scale of the separation of the MMS spacecraft. In this study, we illustrate the very fine-scale structure in the vicinity of the neutral point, demonstrate its finite extent of the x-line, and show its 'permanence'.