

# RESISTIVE PROCESSES IN THE PREFLARE PHASE OF ERUPTIVE FLARES

*The Role of the Perpendicular Magnetic Fields*

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## Abstract

In this study, we perform 2.5-dimensional MHD simulations and clarify the role of *perpendicular magnetic fields* (which are perpendicular to the 2D plane) in a preflare current sheet of solar flares. At the first stage, a current sheet formed within a coronal magnetic structure is filled with the perpendicular fields (force-free structure). Then this sheet begins to be dissipated through the tearing instability under a uniform resistivity. As the instability proceeds, the distribution of the perpendicular fields vary in such a way that most of them gather around O-point (magnetic island) instead of X-point. Therefore, the magnetic pressure of these fields weaken in the vicinity of X-point so that they no longer suppress the inflows toward this point. These flows then make the current sheet thinner and thinner, which implies that the current density around X-point becomes high enough to cause an anomalous resistivity whose value is much larger than that of the normal collisional resistivity. In this way, the transition from a uniform resistivity to a locally-enhanced one occurs, which can make the violent energy release observed in solar flares.

## References

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