



## **The time delay of IMF penetration into Earth's magnetotail**

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Many previous studies have demonstrated that the interplanetary magnetic field (IMF) can control the magnetospheric dynamics. Immediate magnetospheric responses to the external IMF have been assumed for a long time. The specific processes by which IMF penetrates into magnetosphere, however, are actually unclear. Solving this issue will help to accurately interpret the time sequence of magnetospheric activities (e.g., substorm and tail plasmoids) exerted by IMF. With two carefully selected cases, we found that the penetration of IMF into magnetotail is actually delayed by 1–1.5 h, which significantly lags behind the magnetotail response to the solar wind dynamic pressure. The delayed time appears to vary with different auroral convection intensity, which may suggest that IMF penetration in the magnetotail is controlled considerably by the dayside reconnection. Several unfavorable cases demonstrate that the penetration lag time is more clearly identified when storm/substorm activities are not involved.