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Quick reconnection triggering in bifurcated current sheet 1.

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Carrying out large scale three-dimensional full kinetic simulations, we have found that a quick triggering of magnetic reconnection (QMRT) is possible in the thin current sheet where its characteristic thickness is less than the ion inertia length. In the course of QMRT, the lower hybrid drift instability (LHDI) plays crucial role, and the emergence of the thin embedded electron current layer carried by accelerated meandering electrons boosts up the growth of the collisionless tearing mode. A parametric simulation study on QMRT shows that the growth rate is approximately scaled as 1/D. However, when the thickness of current sheet is more than the ion inertia length, this QMRT scaling law breaks down. In such cases, the inductive electric field does not permeate into the neutral sheet, and then, the production of accelerated meandering electron decreases. Instead of the thin current layer, the bifurcated current sheet is generated as a result of the LHDI non-linear evolution in thicker current sheets. We found that the speed of reconnection triggering in the bifurcated current sheet is still much quicker than that predicted by two dimensional theories and that the electron temperature anisotropy resulting from LHDI is a possible candidate to enable QMRT in the bifurcated current sheet.