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Orientation of x-lines in asymmetric magnetic reconnection YI-HSIN LIU, MICHAEL HESSE, MASHA KUZNETSOVA, NASA/GSFC — At Earth's magnetopause, reconnection proceeds asymmetrically between magnetosheath plasmas, namely solar wind plasmas compressed by Earth's bow shock, and magnetospheric plasmas. In an asymmetric configuration, it is unclear if there is a simple principle to determine the orientation of the x-line. Using fully kinetic simulations, we study this issue and a spatially localized perturbation is employed to induce a single x-line, that has sufficient freedom to choose its orientation in three-dimensional systems. The effect of ion to electron mass ratio is investigated, and the x-line appears to bisect the magnetic shear angle across the current sheet in the large mass ratio limit. The deviation from the bisection angle in the lower mass ratio limit can be explained by the physics of tearing instability.¹ The local physics control of the x-line orientation studied in this slab geometry could potentially interplay with global geometrical effects to determine the location of collisionless magnetic reconnection at Earth's magnetopause.

¹Yi-Hsin Liu et al. (2015), arXiv:1504.03300

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