

Abstract Submitted
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Sustained magnetic reconnection requires diffusion EVAN JOHNSON, JAMES ROSSMANITH, University of Wisconsin–Madison — Refer to a plasma model as diffusive if it permits both entropy production and heat flux. Steady two-dimensional reconnection at an X-point is impossible in an energy-conserving model that is not diffusive. We argue that converged simulation of sustained fast magnetic reconnection generally requires a diffusive model. We regard reconnection as sustained if it approaches steady state or is highly sensitive to initial conditions. Examples of sustained reconnection are the GEM problem and steadily driven reconnection; linear tearing is not an example. Examples of nondiffusive models are adiabatic fluid models and models that solve the Vlasov equation. We remark that adiabatic resistive MHD admits steady reconnection by admitting heat flux or by violating energy conservation. Incompressible viscous adiabatic two-fluid models which admit steady reconnection imply that the energy evolution equation is diffusive or nonconservative even if an energy evolution equation is not explicitly evolved.

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