Abstract Submitted
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Magnetic reconnection in nontoroidal plasmas[1] ALLEN BOOZER, Columbia University — Magnetic reconnection in solar and astrophysical plasmas differs fundamentally from the formation of magnetic islands that is characteristic of reconnection in toroidal plasmas. At any instant a generic magnetic field has only point nulls, which can be shown to imply that the evolution of a generic field is consistent, near each spatial point, with being embedded in a perfectly conducting fluid Phys. Rev. Lett. **88**, 215005 (2002). This result implies, in doubly periodic systems, that the nonideal evolution of the magnetic field lines is localized to surfaces on which the magnetic field lines close on themselves, the rational surfaces. That is, the rational surfaces split to form magnetic islands. Rational surfaces are not a credible explanation for reconnection in non-laboratory plasmas-different mechanisms are required. We have shown Phys. Plasmas **12**, 070706, (2005) that the exponentially increasing separation of neighboring magnetic field lines, which is generic, tends to produce rapid magnetic reconnection if the length of the field lines is greater than about 20 times the exponentiation, or Lyapunov, length. This derivation and the importance of this result will be discussed.

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