Abstract Submitted
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Transport Coefficients for Magnetic-Field Evolution in Inviscid Magnetohydrodynamics JONATHAN DAVIES, HAN WEN, University of Rochester — The contributions of the electrothermal and resistivity tensors to magnetic-field evolution in inviscid magnetohydrodyamics are considered. Resistivity leads to anisotropic advection diffusion, with advection due to resistivity gradients that moves the magnetic field to regions of lower resistivity, and an increase in the Hall term. The electrothermal tensor leads to magnetic-field generation due to gradients in effective$Z$ perpendicular to electron temperature gradients, and advection of the magnetic field with electron heat flow. Braginskii's fits do not provide adequate information for $Z > 4$, overestimate the perpendicular resistivity, and underestimate advection with perpendicular electron heat flow (Nernst) at $Z = 1$. Epperlein–Haines' fits give perpendicular resistivity that is discontinuous in Z, causing errors in the gradient, and overestimate advection with cross-field electron heat flow. Ji and Held[1] give the most accurate fits, valid for any Z from 0 to 100. None of the fits give adequate results for advection with cross-field electron heat flow, so a new fit is provided based on a direct numerical solution of the Fokker–Planck equation. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

[1]J.-Y. Ji and E. D. Held, Phys. Plasmas **20**, 042114 (2013).

Jonathan Davies
University of Rochester

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