Reconnection studies using a collisionless fluid closure model

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We study driven reconnection in a quadrupole field geometry using a collisionless magneto-fluid closure model recently derived by one of us[1].The two-fluid model uses an anisotropic pressure tensor with independent evolution equations for the parallel and perpendicular pressures and heat fluxes. For our reconnection studies, the model equations are augmented, in the cold-ion limit, with a generalized Ohm's law of the form

$$\mathbf{E} = -\mathbf{u} \times \mathbf{B} + \frac{1}{en}\left(\mathbf{J} \times \mathbf{B} - \nabla p_{e\perp} - \mathbf{b}(\mathbf{b} \cdot \nabla)(p_{e\|} - p_{e\perp})\right) + \eta \mathbf{J}.$$

These results will be compared with those from a Hall-MHD model using an isotropic electron pressure with an isothermal equation of state, and also with simple reduced resistive MHD.

[1] J. J. Ramos, Phys. Plasmas **10**, 3601 (2003).