

PROBLEM	DESCRIPTION	TESTS	COMMENTS
g-mode (interchange) in a slab (Reyleigh-Taylor-Roberts-Taylor-Parker) (Linear)	$k_{\parallel} = 0$ Walls at infinity	MHD 2-fluid stabilization gyro-viscous stabilization	Verification of MHD and 2-fluid results with NIMROD Gyro-viscosity studies underway Drift CFL limit identified (<i>Schnack, Barnes</i>)
Extensions to g-mode slab problem (Linear)	Transverse magnetic field	k_{\parallel} effects Stabilization Whistlers and KAWs	Will begin after $k_{\parallel} = 0$ studies complete (<i>Schnack, Barnes, Hegna</i>)
	Sheared transverse magnetic field	Mode localization	Need analytic guidance (<i>Hegna, Callen</i>)
	Move walls closer	2-fluid boundary conditions	Uncertainties in how to implement 2-fluid boundary conditions (<i>Schnack, Barnes</i>)
	Scaling with resistivity	2-fluid/GV resistive interchanges and stabilization	Need analytic guidance (<i>Hegna, Callen</i>)
GEM reconnection problem (Nonlinear)	Reconnection in a slab	MHD 2-fluid Gyro-viscosity	Many computational results for MHD, Hall, and PIC models. Underway with NIMROD (Sovinec, Murphy)
Field error penetration (Fitzpatrick) (Non-linear???)	Cylindrical geometry with imposed time dependent field error	Visco-resistive MHD 2-fluid/Hall	Need analytic guidance (<i>Hegna</i>)
Z-pinch (Linear)	Interchanges/kinks with ion "heat stress"	Effect of ion "heat stress" on stability	Effect of heat stress unknown. "Simple" solution may be possible in a pure Z-pinch. Need analytic guidance (<i>Catto</i>)
Gyro-heat flux (Linear)	Add $\kappa_{\perp} \hat{\mathbf{b}} \times \nabla T_i$ to heat flux	Effect of consistent treatment of momentum and heat transport	Need simple problem to test "consistent" ExMHD model (<i>Ramos, Catto</i>)
g-mode/tearing mode coupling (Nonlinear)	Tearing mode evolution in the presence of smaller scale interchanges	Coupling of large and small scales	Nonlinear test case for interaction of scale sizes. Need analytic guidance (<i>Diamond</i>)
Rippling modes (Linear???)	Slab geometry Resistivity and temperature gradients	???	Need problem to be better defined (<i>Diamond</i>)
Energetic species	Stress tensor from minority ion species	Particle closures Gyro-kinetic closures????	Existing results from coupling gyrokinetic(???) model with fluid model (<i>Spong</i>)
Line tied ballooning (Cowley) (Linear and nonlinear???)	g-modes with line tied boundary conditions	MHD (explosive growth) 2-fluid stabilization	Relatively simple test case for ballooning-like modes (<i>Ping Zhu</i>)