Abstract Submitted
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Numerical Studies of Dissipative Phenomena Due To Generalized Parallel Ion Stress[1] MICHAEL ADDAE-KAGYAH, ERIC HELD, Physics Department, Utah State University — Parallel ion stress related phenomena in fusion-grade plasmas, such as wave damping and flow damping, are studied using the NIMROD [1] code. The study constitutes a tentative validation of the effects of the generalized parallel ion stress on the transport properties and physics of plasma systems. Consequently, this work focuses on numerical simulations of plasma systems in which closures for stress related forces is provided by the generalized parallel ion stress tensor and heat flow recently derived and presented by Held [2]. The integral nature of this generalized tensor enables it to accurately capture non-local, long scale-length contributions to relevant fluid transport quantities, for arbitrary regimes of collisionality. The main applications implemented are NIMROD simulations of wave and flow damping, using a local anisotropic stress in alternation with a non-local anisotropicstress (the integral closure). Specifically, sound waves and plasma flow damping rates are are extracted from evolving resistive MHD (and adiabatic) equations in slab geometry. Profiles of damping rate versus temperature (and other parameters) are plotted and analyzed for both single and multiple scale-length flow perturbations. [1]C.R. Sovinec, et al., J. Comput. Phys. 195, 355, (2004). [2]E.D. Held, Phys. Plasmas **10,** 4708 (2003).

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