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Nonlinear finite-Larmor-radius effects in reduced fluid models¹ A.J. BRIZARD, SMC, R.E. DENTON, W. LOTKO, Dartmouth — The polarization and magnetization effects associated with the process of dynamical reduction leading to nonlinear gyrokinetic theory [1] are shown to introduce nonlinear finite-Larmor-radius (NFLR) effects into nonlinear reduced-fluid equations [2]. These intrinsically nonlinear FLR effects, which are associated with the transformation from guiding-center phase-space dynamics to gyrocenter phase-space dynamics, are different from standard FLR corrections, which are associated with the transformation from particle phase-space dynamics to guiding-center phase-space dynamics. The reduced fluid equations with NFLR corrections are derived from a variational principle and, thus, automatically possess an exact energy conservation law. Simulation results show agreement with linear theory, nonlinear energy conservation, and mode coupling of Alfven and sound waves.

[1] A.J. Brizard and T.S. Hahm, Rev. Mod. Phys. 79, 421 (2007).

[2] A.J. Brizard, Phys. Plasmas **12**, 092302 (2005).

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