Abstract Submitted
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Gyrokinetic Models for Edge Plasmas* ANDRIS DIMITS, Lawrence Livermore National Laboratory — The use of gyrokinetic equations for the simulation of magnetic fusion edge and scrapeoff-layer plasmas requires that the equations be valid for large relative perturbation amplitudes and, possibly, large flows. The Hamiltonian gyrokinetic theory has therefore been extended to two new orderings [1,2] that are more general than the standard ones in that they allow for potential perturbations or $\boldsymbol{E}\times\boldsymbol{B}$ flows of order the thermal levels. These theories both generalize and show that additional terms should have been present some related prior work. Here, full (low-β) electromagnetic toroidal equation sets are presented, and he energy conservation relations are derived using Noether's theorem in a Lagrangian variational approach. Useful subsidiary and reduced orderings are also considered that result in considerable simplification, and methods for the numerical implementation of the new terms in the equations will also be discussed. *This work was performed for US DOE by LLNL under Contract DE-AC52-07NA27344 and is part of the ESL.

[1] A.M. Dimits et al., Phys. Fluids B**4**, 274 (1992).
[2] A.M. Dimits, Phys. Plasmas **17**, 055901 (2010).

Andris Dimits
Lawrence Livermore National Laboratory

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