Abstract Submitted
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Conservation Laws for Gyrokinetic Equations for Large Perturbations and Flows[1] ANDRIS DIMITS, LLNL — Gyrokinetic theory has proved to be very useful for the understanding of magnetized plasmas, both to simplify analytical treatments and as a basis for efficient numerical simulations. Gyrokinetic theories were previously developed [1-3] in two extended orderings that are applicable to large fluctuations and flows as may arise in the tokamak edge and scrapeoff layer. In the present work, we cast the resulting equations in a field-theoretical variational form, and derive, up to second order in the respective orderings, the associated global and local energy and (linear and toroidal) momentum conservation relations that result from Noether's theorem. The consequences of these for the various possible choices of numerical discretization used in gyrokinetic simulations are considered. [1] A.M. Dimits, Phys. Plasmas **19** 022504 (2012); [2] A.M. Dimits, Phys. Plasmas **17**, 055901 (2010); [3] A.Y. Sharma and B.F. McMillan, Phys. of Plasmas **22**, 032510 (2015).

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