

Abstract Submitted
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Lifting the Vlasov-Maxwell bracket by Lie-transform methods¹

A.J. BRIZARD, SMC, P.J. MORRISON, IFS and UT Austin, M. VITTOT, L. DE GUILLEBON, CPT CNRS Luminy — The Vlasov-Maxwell equations possess a Hamiltonian structure expressed in terms of a Hamiltonian functional and a functional bracket [1]. In the present work, the transformation (“lift”) of the Vlasov-Maxwell bracket induced by the dynamical reduction of single-particle particle dynamics is investigated when the reduction is carried out by Lie-transform perturbation methods. A formal proof of the Jacobi identity for the reduced Vlasov-Maxwell bracket is presented. The ultimate goal of this work is to derive explicit Hamiltonian formulations for the guiding-center and gyrokinetic Vlasov-Maxwell equations that have important applications in our understanding of turbulent magnetized plasmas. A comparison with a bracket structure [2] for the gyrokinetic Vlasov-Poisson equations derived by Dirac-constraint method will be presented.

[1] See P.J. Morrison, RMP **70** 467 (1998) and references therein.

[2] J. Squire, H. Qin, W.M. Tang, and C. Chandre, PoP **20**, 022501 (2013).

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