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Wide phase space holes on the tail of an electron distribution[1]

MARTIN V. GOLDMAN, DAVID L. NEWMAN[2], University of Colorado — In a recent Letter [1], a theoretical analysis showed weak electron phase space holes to be consistent with bipolar fields measured in space plasmas. The moving potential structure was found to be of the form sech^4(x/a), where "a" depends on the distribution of *untrapped* electrons, which solely determines the hole spatial half-width as a function of hole speed. by contrast, the hole amplitude depends on the distribution of *trapped* electrons and is therefore independent of the hole speed. Motivated by magnetic reconnection simulations and laboratory measurements that exhibit tails on the parallel electron distributions, this treatment has now been extended to include a broad tail on the untrapped Maxwellian electron distribution, which is self-consistent with a weak moving potential structure of the same sech^4 form. Analytic solutions are found in which the holes are spatially wider and faster than for distributions without tails. The role of ions in these solutions is also studied. Vlasov simulation addressing the stability and and accessibility of these analytic phase-space solutions are discussed in a companion presentation (D. L. Newman, this meeting).

[1] Goldman, Newman, and Mangeney, *PRL*, **99**, 145002 (2007).

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