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Interactive comment on "Vlasov simulation of electrons in the context of hybrid global models: A Vlasiator approach" *by* Markus Battarbee et al.

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I have read this paper with much interest, since it promises to solve a long-standing problem in plasma simulations, namely the large separation of scales between ions and electrons. However, I have found this paper disappointing and completely unclear in the descriptions of the numerical algorithm. For me, the main question remains: How can you follow the electron VDF in a hybrid model? Either you have kinetic electrons or you don't. This approach does not seem to follow neither the Darwin approximation, nor the neutral vlasov approach proposed in https://doi.org/10.1063/1.4907665 So how do they do it??

Thank you for your interest in our work. We would like to temper expectations in that we

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Discussion paper

do not propose to solve the scale separation issue, but instead offer a new simulation method for evaluating certain aspects of electron dynamics within a plasma environment generated by a hybrid model. We also acknowledge that certain facets of this code shall be improved upon in the future, but that is the nature of all simulation codes.

We found the neutral Vlasov approach an interesting read, and note that it indeed takes a different approach, investigating the low-frequency limit. We commend the convergence approach taken in that paper. Our paper does not aim to supersede that method, but rather provide a complementary approach, focusing the investigation on high-frequency electron oscillations within the simulated magnetic domain.

We shall strive that the clarified revision of our manuscript shall be clearer in how our model relates to existing codes and approaches. However, we respectfully refrain from designating electron kinetics into a binary categorization - it is possible to model different aspects of electron kinetics, always making some compromises along the way.

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