Wave modes in the hybrid-Vlasov plasma model: comparison of Vlasiator and WHAMP results

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Vlasiator is a new hybrid-Vlasov finite-volume plasma dynamics simulation code designed for massively parallel large-scale simulations. It combines the kinetic description of ions through their six-dimensional distribution function in the position and velocity spaces with massless, charge-neutralising fluid electrons. Vlasiator solves Vlasov's equation for the ions and MHD equations for the electron fluid. It uses a sparse representation of the velocity space and a hybrid MPI+OpenMP approach to enable scaling to the largest modern supercomputers. In order to determine the physical characteristics of the hybrid-Vlasov model we compare dispersion plots obtained from local one-dimensional simulations with results from the WHAMP code solving numerically Vlasov's equation for the dispersion relation. We will show the excellent match of the two approaches and discuss the relevance of the wave modes described in the context of global magnetospheric simulations.