Parareal simulations of highly oscillatory Vlasov equations

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We are interested in solving numerically multi-scale in time Vlasov-type models, by means of a specific version of the parareal algorithm. More precisely we use reduced models obtained from the two-scale convergence theory, for the coarse solving. The reduced models are useful to approximate the original Vlasov model at a low computational cost since they are free of high oscillations. We illustrate this strategy with numerical experiments based on long time simulations of charged particle beams in strong magnetic or electric fields. We provide an analysis of the efficiency of the parareal algorithm in terms of speedup.

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