

An adaptive multiscale semi-Lagrangian method for the Vlasov-Poisson equation

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An adaptive multiscale scheme is proposed for the discretization of the Vlasov-Poisson equation. This scheme is based on a semi-Lagrangian discretization : at each time step, the solution is transported and re-interpolated on a grid which differs from the previous one. The strategy for transporting the grid is designed in such a way that the anticipated interpolation error is controlled by a prescribed tolerance in the uniform norm, which allows us to derive rigorous error estimates. Numerical results illustrate the ability of the scheme to capture the filamental structures developed by the solution with an optimal balance between accuracy and complexity.