

Asymptotic-Preserving scheme for the resolution of evolution equations with stiff transport terms

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We develop an asymptotic-preserving scheme to solve evolution problems containing stiff transport terms. This scheme is based on a micro-macro decomposition of the unknown, coupled with a stabilization procedure. The numerical method is applied to the Vlasov equation in the gyrokinetic regime and to the Vlasov-Poisson 1D1V equation, models occurring in plasma physics. The asymptotic-preserving properties of our procedure permit to study the long-time behavior of these models. In particular, we limit drastically by our AP-method the numerical pollution, appearing in such time asymptotics when using classical numerical schemes.