



SISMA

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An asymptotic preserving kinetic scheme for the M1 model of linear transport

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Moment models with suitable closure can lead to accurate and computationally efficient solvers for particle transport. Hence, we propose a new asymptotic preserving scheme for the M1 model of linear transport that works uniformly for any Knudsen number. Our idea is to apply the M1 closure at the numerical level to an existing asymptotic preserving scheme for the corresponding kinetic equation, namely the Unified Gas Kinetic scheme (UGKS) originally proposed by Xu and Huang extended to linear transport by Mieussens. In order to ensure the moments realizability in this new scheme, the UGKS positivity needs to be maintained. We propose a new density reconstruction in time to obtain this property. A second order extension is also suggested and validated. Several test cases show the performances of this new scheme. We also plan to explain how to extend the scheme to linear Fokker-Planck equation.

This is a joint work with Nicolas Crouseilles, Jean-Luc Feugeas (CELIA, Bordeaux), Luc Mieussens (IMB, Bordeaux), Thomas Vigier (CELIA, Bordeaux).