

## **High order AP schemes for some discrete-velocity kinetic equations**

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A family of high order asymptotic preserving (AP) schemes is proposed for several discrete-velocity kinetic models in a diffusive scaling. Our proposed methods are based on the micro-macro decomposition of the equations, and they combine discontinuous Galerkin (DG) spatial discretizations and globally stiffly accurate implicit-explicit (IMEX) Runge-Kutta temporal discretizations. Formal asymptotic analysis shows that the proposed schemes in the limit of  $\epsilon \rightarrow 0$  are explicit and consistent discretizations for the limiting equations. When a first order IMEX method is used, uniform stability with respect to  $\epsilon$  is established for the telegraph equation. Error estimates are also obtained for any given  $\epsilon$ . Numerical examples are presented to validate some theoretical results and to demonstrate the performance of the methods.