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An entropy-dissipative quadrature-based closure for moment systems

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The method of moments is commonly used to reduce a kinetic equation into a fluid model. It can be seen as a semi-discretization with respect to the kinetic variable, and it results in a system of balance laws that needs additional closure relations. The choices made in this construction have impacts on the properties of the resulting system, namely the strong or weak hyperbolicity, the entropy dissipation, or the geometry of the admissible solution set. Among the closures available in the literature, the quadrature-based ones provide a simple construction and good algorithmic properties. But the mathematical structure of the resulting system of PDE yields discrepancies compared to the original kinetic equation. I will present the common construction and properties of the quadrature-based closures, and provide an alternative based on symmetrization techniques to retreive strong hyperbolicity and a tuned entropy dissipation.

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