Abstract Submitted
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Maximum-entropy reconstruction method for moment-based solution of the Boltzmann equation DUSTIN SUMMY, DALE PULLIN, California Institute of Technology — We describe a method for a moment-based solution of the Boltzmann equation. This starts with moment equations for a $10 + 9\,N, N = 0, 1, 2...$-moment representation. The partial-differential equations (PDEs) for these moments are unclosed, containing both higher-order moments and molecular-collision terms. These are evaluated using a maximum-entropy construction of the velocity distribution function $f(\mathbf{c}, \mathbf{x}, t)$, using the known moments, within a finite-box domain of single-particle-velocity ($\mathbf{c}$) space. Use of a finite-domain alleviates known problems (Junk and Unterreiter, *Continuum Mech. Thermodyn.*, 2002) concerning existence and uniqueness of the reconstruction. Unclosed moments are evaluated with quadrature while collision terms are calculated using a Monte-Carlo method. This allows integration of the moment PDEs in time. Illustrative examples will include zero-space- dimensional relaxation of $f(\mathbf{c}, t)$ from a Mott-Smith-like initial condition toward equilibrium and one-space dimensional, finite Knudsen number, planar Couette flow. Comparison with results using the direct-simulation Monte-Carlo method will be presented.

Dale Pullin
California Institute of Technology

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