



Computational Numerical Integration for use with Model Boltzmann Equations

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Boltzmann Equation

- Finding the number of particles using momenta or velocity.
- No external forces
- Knudsen number and continuity.
- Navier-Stokes

$$dN = f(\mathbf{r}, \mathbf{p}, t) d^3\mathbf{r} d^3\mathbf{p}$$

$$\rho \left(\frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v} \right) = -\nabla p + \nabla \cdot \mathbf{T} + \mathbf{f},$$

Probability Distribution Function

- The function the Boltzmann Equation solves for
- Can be integrated to provide moments of the Boltzmann Equation (density, velocities, temperatures)

- $\iiint f dV = n$

- $\iiint V_i f dV = n U_i$

- $\iiint C^2 f dV = (3n/2) T$

- $\iiint C^2 V_i f dV = (3n/2) T q_i$

Spherical Integration Quadrature

