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## **Macroscopic Transport Equations For Rarefied**

Thus, the proper simulation of flows in rarefied gases requires a more detailed description. This book discusses classical and modern methods to derive macroscopic transport equations for rarefied gases from the Boltzmann equation, for small and moderate Knudsen numbers, i.e. at and above the Navier-Stokes-Fourier level.

## **Macroscopic Transport Equations for Rarefied Gas Flows**

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Struchtrup H. (2005) Macroscopic transport equations for rarefied gas flows. In: Macroscopic Transport Equations for Rarefied Gas Flows. Interaction of Mechanics and Mathematics.

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Methods to derive macroscopic transport equations for rarefied gases from the Boltzmann equations are presented. Featured methods include the Chapman-Enskog expansion, Grad's

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moment method, and ... (PDF) Macroscopic Transport Equations for Rarefied Gas ... ate Knudsen numbers, extended macroscopic transport equations offer an alternative to the

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### MACROSCOPIC TRANSPORT MODELS FOR RAREFIED GAS

7 of 26 The idea of the CE expansion method is to add corrections to the local equilibrium distribution by adding terms of higher orders in the Knudsen number,  $f = f(0) + Kn f(1) + Kn^2 f(2) + \dots$ , (3.2) subject to the condition that the hydrodynamic variables  $\{\rho, v_i, \theta\}$  are the same at any level of expansion, so that  $\rho^{(1)}, v_i^{(1)}, \theta^{(1)} = m \int Z(1, c_i, C^2$

## Macroscopic transport models for rarefied gas flows: a ...

Many macroscopic equations are proposed to describe the rarefied gas dynamics beyond the Navier-Stokes level, either

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from the mesoscopic Boltzmann equation or some physical arguments, including (i) Burnett, Woods, super-Burnett, augmented Burnett equations derived from the Chapman-Enskog expansion of the Boltzmann equation, (ii) Grad 13, regularized 13/26 moment equations, rational extended thermodynamics equations, and generalized hydrodynamic equations, where the velocity distribution ...

## **On the accuracy of macroscopic equations for linearized**

...

Struchtrup, H. 2005b Macroscopic Transport Equations for Rarefied Gas Flows. Springer . Struchtrup , H. 2012 Unique moment set from the order of magnitude method .

## **Macroscopic and kinetic modelling of rarefied polyatomic**

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The main goal of this section is to study the nonlinear transport

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phenomena and macroscopic flow behavior of rarefied Couette flows from low speed to high speed, with particular concentration on the detailed structure of the nonisothermal KL and the shear-stress Knudsen number dependence of the effective transport coefficients in the whole system.

## **Nonlinear transport of rarefied Couette flows from low ...**

The basis of most of the approaches to modeling of rarefied gases is the Boltzmann equation. In the continuum limit, a set of macroscopic transport equations can be obtained from the Boltzmann equation, and the Chapman-Enskog method utilized for their closure.

## **Influence of angular momentum on transport coefficients in ...**

The R13 equations, derived from the Boltzmann equation using the moment method, provide closure to the mass, momentum

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and energy conservation laws in the form of constitutive,  
transport equations for the stress and heat flux that extend the  
Navier–Stokes–Fourier model to include non-equilibrium effects.

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