

## **Boltzmann equation and conservation laws**

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Conservation laws, the Euler and Navier-Stokes equations for gas dynamics, are derived through Hilbert and Chapman-Enskog expansions. With Shih-Hsien Yu and others, we devise a macro-micro decomposition to rewrite the Boltzmann equation into fluid and non-fluid parts. The conservation laws become part of Boltzmann equation. The decomposition is useful for the study of nonlinear waves. It has been used to verify the positivity of the Boltzmann shock profiles. The H-theorem has also its fluid part representation. This natural representation is useful for the energy method. Our energy method yields a elementary verification of the time-asymptotic stability of Maxwellian states. In this talk, we will start with basic properties of Boltzmann equation and relates these to the theory for hyperbolic and viscous conservation laws.