Introduction to the Boltzman equation

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Abstract

My aim is to give brief introduction to the Boltzman equation which provides mathematical model for the statistical evolution of a moderately rarefied gas

$$\frac{\partial f}{\partial t} + \xi \cdot \nabla_x f = Q(f, f) \text{ in } (0, \infty) \times \mathbb{R}^N \times \mathbb{R}^N, \qquad (1)$$

where $N \geq 1$, $x \in \mathbb{R}^N$, $\xi \in \mathbb{R}^N$ and $Q(f, f)$ is the collision operator.

I focus on the major obstructions to a complete understanding of the Cauchy problem for (1). Moreover, I present possible ways to overcome the obstacles, namely the method of renormalized solutions.

References

[1] R. J. DiPerna and P. L. Lions, On the Cauchy Problem for Boltzmann Equations: Global Existence and Weak Stability, *Annals of Mathematics , Second Series, Vol. 130, No. 2 (Sep., 1989), pp. 321-366*