

On the Estimates of the Gain Term of the Boltzmann Collision Operator

Jin-Cheng Jiang

National Tsing Hua University
E-mail: jcjiang@math.nthu.edu.tw

Abstract

In this talk, we discuss the properties of the gain term of the Boltzmann collision operator. The smoothing property of this operator was first found by P. L. Lions under compactness assumption for the collision kernel. His proof relies on the theory of Fourier integral operator and related to the work of C. Sogge and E. Stein. A simplified proof, using Fourier transform, of the same result was given by B. Wennberg. The estimate of Lions was extended to full collision kernel by B. Wennberg, F. Bouchut, L. Desvillettes, X. Lu, C. Mouhout, C. Villani., myself and other authors. On the other hand, T. Gustafsson proved that it is a convolution operator. For the hard sphere and hard potential models, we prove the new smoothing estimates which improve current results slightly. The new result also provide a unified view to smoothing estimate and convolution estimate for the gain term of the Boltzmann collision operator.