

A conservative spectral method for the Boltzmann equation with anisotropic scattering and the grazing collisions limit

Jeffrey Haack, University of Texas at Austin

We present the formulation of a conservative spectral scheme for Boltzmann collision operators with anisotropic scattering mechanisms to model grazing collision limit regimes approximating the solution to the Landau equation in space homogeneous setting. This formulation is derived from the weak form of the Boltzmann equation, which can represent the collisional term as a weighted convolution in Fourier space. Within this framework, we also study the rate of convergence of the Fourier transform for the Boltzmann collision operator in the grazing collisions limit to the Fourier transform for the Landau collision operator. We show that the decay rate to equilibrium depends on the parameters associated with the collision cross section, and specifically study the differences between the classical Rutherford scattering angular cross section, which has logarithmic error, and an artificial one with a linear error.

Joint work with Irene M. Gamba (Texas)