

# Existence of non zero flux solutions to homogeneous Boltzmann equation.

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## Resumen

Boltzmann type kinetic equations describe a dilute set of colliding particles under different physical conditions. Generally they present some formal conservation laws, reflecting the underlying physical hypothesis. These equations have stationary solutions, independent of time, which describe the set of particles at equilibrium. These solutions, called equilibria of the equation, also satisfy in general the conservation laws of the equation. Moreover they often describe the long time asymptotic behaviour of more general solutions.

It turns out that, for some of these kinetic equations, it is also possible to find solutions which are still stationary but which are not equilibria. These solutions have non zero fluxes of some of the “natural” quantities associated to the model (number of particles, momentum, energy,...) and therefore, they do not satisfy the conservation laws of the kinetic equation. They may then be interesting in the study of the dynamics of more general solutions of the equation.

Nevertheless, the natural physical quantities (number of particles, energy,...) of the problem are not well defined for these stationary non equilibrium solutions. We shall present recent results where, for two kinetic equations of this type, we prove the existence of non stationary solutions with non zero flux of particles for which the natural physical quantities are well defined. After a brief motivation of the two examples I will present them in the general context of the weak turbulence theory[2]. Then I will state the precise results and will finally give a sketch of the proof, insisting in the different aspects of the two cases under consideration.

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## Referencias

- [1] A. C. Newell, S. Nazarenko and L. Biven, *Wave turbulence and intermittency*. Physica D, 152-153, 2001.
- [2] M. Escobedo, S. Mischler and J. J. L. Velazquez, *Singular Solutions for the Uehling Uhlenbeck Equation*. Proc. Roy. Soc. Edinburgh, 67-107, 2008.