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On the Boltzmann relation in a cold magnetized plasma[1]
LORENZO NASI, JEAN-LUC RAIMBAULT, Laboratoire de Physique des Plasmas — A systematic and exact comparison between the forces acting on magnetized electrons is considered within a fluid model. We show that the Boltzmann relation is fulfilled in the drift-diffusion approximation when $(h_i/h_e)(1+h_e^2)/(1+h_i^2) \ll 1$ where h_e (or h_i) is the ratio of the electron (or ion) cyclotron to the collision frequency. When the non-linear inertia terms are taken into account, the previous criterion is too rough and must be modified. In particular it is proved that the Boltzmann relation is not uniformly valid in the discharge. The case of bounded plasmas where the electron temperature must be determined self-consistently is discussed in detail.

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