

NUMERICAL STUDY OF GRAIN CHARGING
KINETICS ON THE BASIS OF BGK
KINETIC EQUATION

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S u m m a r y

An investigation of charging a spherical particle in partially ionized nonisothermal plasma is carried out on the basis of the numerical solution of the BGK (Bhatnagar–Gross–Krook) model kinetic equation. Stationary values of the particle charge and the electron and ion currents are calculated for various collisional regimes. It is verified that, for the strongly collisional regime, the effective potential has a Coulomb form at large distance from the particle surface. A new BGK-type model for binary gas mixtures is proposed. It is shown that this model satisfies all the basic properties of Boltzmann collision integrals including the correct exchange coefficients. A high-order implicit numerical method for solving the kinetic equations is developed. The method is conservative with respect to the collision integrals for arbitrary values of the Knudsen number.