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THE HALL THRUSTER**Abstract**

At laboratory testing of Hall thrusters analysis of stability of ion beam in a drift tube is an important problem. The limiting current of the quasineutral ion beam with the total current of the order of one ampere and a small amount of kinetic energy (100-300 eV) in laboratory conditions, namely in the drift tube filled with own gas, is considered. The total time of neutralization of the ion beam in a drift tube and the duration of the process of ion-beam plasma formation are estimated. The problem of electrostatic instability of quasineutral ion beam in a drift tube is considered. The limiting current of electrostatic instability of the quasineutral ion beam represents threshold value of a current above which instability develops without any initial perturbations from infinitely small random fluctuation of potential. In real conditions practically always there are initial perturbations of the ion beam current. For this reason the problem of dynamic decompensation at a finite depth current modulation of the quasineutral ion beam is also considered. Modulation of the ion current leads to a pulsation of the ion beam charge, that, in turn, leads to modulation of ion-beam plasma potential and, hence, of accelerating voltage. It is shown, that the limiting current of electrostatic instability of the quasineutral ion beam in a drift tube is proportional to the concentration of residual gas, to the radius of a drift tube, to the cube of an accelerating voltage and inversely proportional to the potential of ion-beam plasma raised to power of one and a half. It is shown, that the influence of finite modulation of the ion beam current leads to decrease of the instability threshold.