

Blinov, N. A.; Bojko, V. V.; Leont'ev, I. A.; Sinel'nikov, V. P.; Filippov, S. S.; Tsatsulin, M. I.; Cheburkin, N. V.

Development of overheat instability in the plasma of a high pressure space discharge. (English. Russian original) [Zbl 0639.76056](#)
U.S.S.R. Comput. Math. Math. Phys. 26, No. 3, 51-58 (1986); translation from Zh. Vychisl. Mat. Mat. Fiz. 26, No. 5, 723-733 (1986).

A hydrodynamic model of quasistreamer breakdown based on the system of equations of magnetohydrodynamics is studied. A third-order linear partial differential equation is obtained for the density disturbance of the plasma neutral component. Cauchy problems for this equation with localized and non-localized disturbances are solved by asymptotic methods (*D. Ludwig's* method [Commun. Pure Appl. Math. 13, 473-508 (1960; [Zbl 0098.296](#))] and the WKB method). In the disturbed domain, anisotropic generation of three modes (one entropy and two acoustic modes) occurs. The short-term solutions obtained give a picture of the development of instability in satisfactory agreement with experimental data. The absolute instability of the homogeneous plasma of non-self-sustained and self-sustained gas discharge is proved.

MSC:

[76E25](#) Stability and instability of magnetohydrodynamic and electrohydrodynamic flows
[76X05](#) Ionized gas flow in electromagnetic fields; plasmic flow

Keywords:

hydrodynamic model of quasistreamer breakdown; third-order linear partial differential equation; density disturbance; plasma neutral component; Cauchy problems; non-localized disturbances; asymptotic methods; WKB method

Full Text: [DOI](#)