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P2.4015 Energy parameters of Cs-Ba triode in the unstable discharge mode

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See full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P2.4015.pdf
Low-temperature plasma finds a wide practical application in devices used in the current control circuits of space and ground-based nuclear power plants: modulators, thermionic converters, current and voltage stabilizers and etc. One of the most important requirements for devices of such appointment is the ability of troubleproof work under conditions of high temperature and considerable radiation load [1].
The paper presents the results of studies of the electrokinetic parameters of Cs-Ba vapor triode modulators. The possibility of effective current modulation due to the development of nonlinear plasma structures formed during the excitation of the BursianPierce instability is discovered. Potential distribution with a virtual cathode is formed, which leads to a current breakage. The current changes almost instantly, since the process of the formation of a virtual cathode proceeds over a time of the order of the electron mean free time through the gap, what is important for the successful practical use of triode modulators.
The achieved high transition process rates had a positive effect on the efficiency and frequency characteristics of the device. A high electric strength has been realized, which makes possible to keep the triode in the locked state after a current breakage for a long time. In the considered operating regimes the role of the grid is reduced to maintaining the locked state, ensuring high electrical strength and reigniting the discharge. High energy parameters of triode modulators were achieved:
- at an interelectrode gap of 4 mm and Ps 102 torr, the values of current density were up to 100 A/cm2, the voltage losses in the open state were in the range of 0.82.5 V;
- stably modulated power of 1.8 kW/cm2 with an efficiency of more than 95%; - modulator operating modes were found in which, with an increase in the density of the modulated current, energy consumption in the grid circuit falls. With an anode voltage of 50 V, a stable modulation was obtained at frequencies of 1-10 kHz with a specific electric power of 5 kW/cm2 and an efficiency of more than 95%. References
[1] Mustafaev, A.S. Low-voltage beam discharge in light inert gases to solve problems of voltage stabilization / A.S. Mustafaev, A.Y. Grabovskiy - High Temperature. - 2017. - Vol. 55, 1. - pp. 20-26.

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