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# PULSED-PERIODIC PLASMA MASER WITH DOUBLE COAXIAL PLASMA-METAL WAVEGUIDE *)

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Plasma maser, shown in the figure, was created for the first time, in which a double coaxial waveguide is used as a generator section, the external (1) and internal (2) electrodes of which are metallic, and the role of the middle electrode is played by tubular plasma (3).

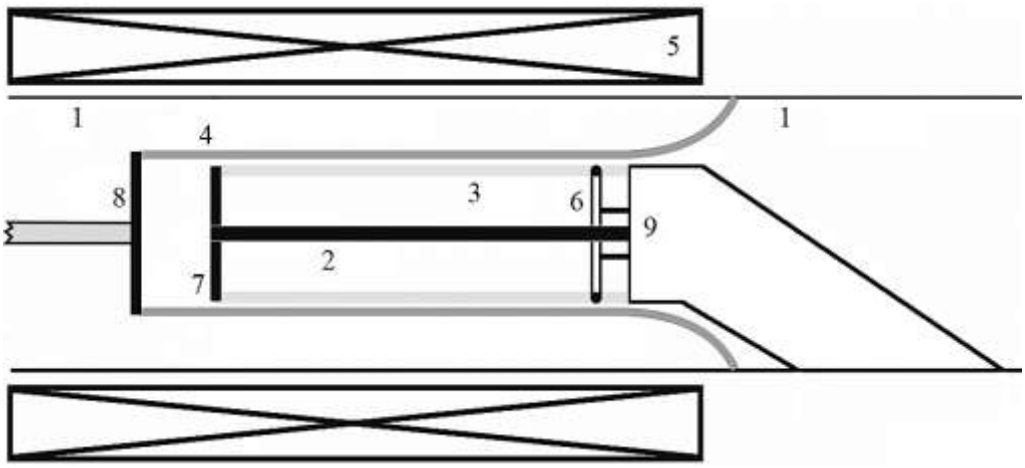


Fig.1 Plasma maser. 1 – external electrode of the coaxial waveguide; 2 – internal electrode of the coaxial waveguide; 3 – tubular plasma; 4 – relativistic electron flux; 5 – solenoid; 6 – plasma source; 7 – plasma limiter; 8 – explosive emission cathode; 9 – plasma source holder

The tubular relativistic electron flux (REF) (4) propagates in the solenoid (5) strong magnetic field outside the plasma (3) generated by the source (6) and is deposited onto the walls of the vacuum chamber (1). The plasma limiter (7) prevents the cathode (8) from short-circuiting through the plasma (3), the internal electrode of the coaxial waveguide (2) and the plasma source holder (9) to the housing. The created plasma maser is designed to operate in pulse-periodic mode, since the limiter attachment (2) does not prevent the REF propagation.

As it was shown in [1], the use of such a plasma maser system "makes it possible to increase the electron beam current transported through the system, at which the instability increment and the efficiency of the conversion of the energy of directed motion of electrons also increase".

The plasma maser was operating in the noise amplification mode. An electron flux with an energy of 250 keV, a current of up to 1.5 kA, and a duration of 2.5 ns interacted with plasma which measured concentration was up to 3·1013 cm-3. Emission was recorded, the spectrum of which was tunable in the range 3...16 GHz at power from 10 MW to 100 MW.

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## References

[1]. I.N. Kartashov and M.V. Kuzelev. The Use of a Coaxial Electrodynamic System for Amplification of Microwave Range Waves During the Development of Beam–Plasma Instability // Plasma Physics Reports, 2021, Vol. 47, No. 6, pp. 548–556.

*) abstracts of this report in Russian