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Title:A 670 GHz gyrotron with record power and efficiency
Authors:Glyavin, M.Yu. (1); Luchinin, A.G. (1); Nusinovich, G.S. (2); Rodgers, J. (2); Kashyn, D.G. (2); Romero-Talamas, C.A. (2); Pu, R. (2)
Author affiliation:(1) Institute of Applied Physics, RAS, N. Novgorod, 603950, Russia; (2) IREAP, University of Maryland, College Park, MD 20742, United States
Corresponding author:Glyavin, M.Yu.
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Abstract:A 670 GHz gyrotron with record power and efficiency has been developed in joint experiments of the Institute of Applied Physics, Russian Academy of Sciences (Nizhny Novgord, Russia), and the University of Maryland (USA) teams. The magnetic field of 27-28 T required for operation at the 670 GHz at the fundamental cyclotron resonance is produced by a pulsed solenoid. The pulse duration of the magnetic field is several milliseconds. A gyrotron is driven by a 70 kV, 15 A electron beam, so the beam power is on the order of 1 MW in 10-20 ms pulses. The ratio of the orbital to axial electron velocity components is in the range of 1.2-1.3. The gyrotron is designed to operate in the TE <inf>31,8</inf>-mode. Operation in a so high-order mode results in relatively low ohmic losses (less than 10 of the radiated power). Achieved power of the outgoing radiation (210 kW) and corresponding efficiency (about 20) represent record numbers for high-power sources of sub-THz radiation. © 2012 American Institute of Physics.
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