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Start currents in gyro-backward-wave oscillators of the THz frequency range¹ GREGORY NUSINOVICH, SAMIR CHAINANI, VICTOR GRANATSTEIN, IREAP, University of Maryland, GYROTRON THEORY TEAM — Gyro-backward-wave oscillators (gyro-BWOs) are unique frequency-tunable sources of high-power, high-frequency electromagnetic radiation. Our group is planning to start experiments in the THz frequency range with gyro-BWOs having highly selective confocal waveguides. At such high frequencies, the wave attenuation in the circuit walls can be significant. In the present paper, analysis of the start currents of such gyro-BWOs is carried out. It is shown how to use known results of the linear theory of conventional backward-wave oscillators for analyzing the starting conditions in the gyro-BWO with finite attenuation. When a thin annular electron beam is injected in a confocal waveguide, different beamlets interact with the electromagnetic field of a different intensity. The effect of this transverse nonuniformity on the start current and the efficiency is also analyzed.

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Gregory Nusinovich
IREAP, University of Maryland

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