

Design and Simulation of Interaction Structure for 110GHz Second-Harmonic Gyro-TWT

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In this paper, the application of nonlinear theory in high harmonic gyrotron traveling wave amplifiers (gyro-TWT's) is analysed. And a beam-wave interaction structure of 110GHz second-harmonic gyro-TWT is designed. The simulation indicates that, in ideal case, the interaction structure can produce more than 70kW outer power when 70kV and 10A electron beam is input. Also, employing secondharmonic achieve high-frequency, single-mode and stable output. This paper describes the high stability and wide bandwidth of 110GHz TE₀₁ mode gyro-TWT and the technique of design and simulation in particle-in-cell(PIC) simulation software-MAGIC. The interaction structure of gyro-TWT employs ceramic loading, and indicates the effective of dielectric-loaded for suppressing the spurious oscillations and improve stability.