URN etd-0407109-183705-322
Author Ting-Shu Wu
Author's Email Address No Public.
Statistics This thesis had been viewed 39 times. Download 12 times.
Department
Year 2003
Semester 2
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Second Harmonic TE21 Gyrotron Backward Wave Oscillator
Date of Defense 0000-00-00
Page Count 64

Keyword
harmonic gyrotron backward wave oscillator
relaxation length
transit angle
stationary and nonstationary state

Abstract
The gyrotron backward wave oscillator (gyro-BWO) is a promising source of coherent millimeter wave radiation based on the electron maser instability on a backward waveguide mode. However, a high magnetic field requirement limit on its applicability as a millimeter-wave source. The required magnetic field is reduced by the harmonic operation in this project. The harmonic gyrotron backward-wave oscillator not only has the feature of the frequency tuning using by the applied magnetic field and beam voltage, but also has the low applied magnetic field and high beam current.

A comparative analysis between the fundamental and second cyclotron harmonics of gyrotron backward-wave oscillators (gyro-BWOs) is analyzed presented. The simulation results reveal that the nonlinear field contraction is a common feature for both harmonics interactions. Besides, the electron transit angle, used to characterize the axial modes of the fundamental harmonic TE11 mode at the start-oscillation conditions, is found to be applicable even for the second harmonic TE21 mode. Each axial mode of either the fundamental harmonic TE11 or the second harmonic TE21 modes is maintained at a constant value of the electron transit angle while changing the operating parameters, such as magnetic field and beam voltage. Extensive numerical calculations have been conducted for the starting currents and tuning properties. A single-mode operating regime is suggested where the second harmonic TE21 gyro-BWO is stable with a decent output power, comparing with the fundamental harmonic TE11 gyro-BWO.
Advisory Committee Yi Sheng Yeh - advisor

Files etd-0407109-183705-322-001.pdf

indicate access worldwide
Date of Submission 2004-06-30