Session 11. TWTs-II

April 30 (Tuesday) / 10:20 ~ 11:40 / Room 2

Session Chair: R. K. Sharma (Central Electronic Engineering Research Institute, India)

10:20 ~ 10:40

11.1 / [Keynote] Two-Beam Ku-Band Oscillator-Amplifier Using a Planar Helix Slow-Wave Structure

Ajith Kumar M. M (Nanyang Technological University, Singapore), Sheel Aditya (Nanyang Technological University, Singapore)

A novel two-beam oscillator-amplifier based on planar helix slow-wave structure with straight-edge connections is presented. The device combines the operation of both oscillator and amplifier in a single slow-wave structure. The simulation results show that the operating frequency of the oscillator-amplifier tunes from 14.1 GHz to 19.1 GHz when the beam voltage for backward-wave synchronization varies from 3 KV to 8 KV. The output performance of the oscillatoramplifier is compared with that of the conventional backward wave oscillator (BWO) using the same slow-wave structure. The comparison shows that the oscillator-amplifier gives an efficiency improvement of at least two times compared to that of the conventional BWO. Significantly, the oscillator-amplifier preserves the size as well as the tuneable bandwidth of the conventional BWO.

10:40 ~ 11:00

11.2 / Group Delay Distortion Optimization for a L-band Helix TWT with a Positive-Tapered Pitch Segment

Wenkai Deng (University of Electronic Science and Technology of China, China), Yulu Hu (University of Electronic Science and Technology of China, China), Quan Hu (University of Electronic Science and Technology of China, China), Xiaofang Zhu (University of Electronic Science and Technology of China, China), Bin Li (University of Electronic Science and Technology of China, China)

Group delay is an important parameter to evaluate the performance of space traveling wave tubes. In this paper, a positive-tapered pitch profile is introduced in the input segment and the length of the second segment is slightly adjusted to optimize the group delay performance of a L-band space TWT. Using this method, the group delay is finally successfully reduced to less than 1ns without loss of gain. The optimization is fulfilled in Microwave Tube Simulator Suite.

11:00 ~ 11:20

11.3 / Tape-Helix Analysis of Shielded Planar Helix Slow-Wave Structure

Ajith Kumar M. M (Nanyang Technological University, Singapore), Sheel Aditya (Nanyang Technological University, Singapore)

An analysis using tape-helix approximation to determine the dispersion characteristics and interaction impedance of planar helix slow-wave structure with straight edge connections shielded by a metal enclosure is presented. The complexity of the analysis is reduced by incorporating the characteristic equation of an infinitely wide planar helix inside a metal enclosure with the effective dielectric constant methods. The results from this analysis are compared with those from the CST microwave studio. The comparison shows that the results from the presented tape-helix analysis are accurate in the frequency range far from cutoff.

11:20 ~ 11:40

11.4 / A Simulation Method of Graphite Heat Extrusion Process for High-Frequency Structure of Helix TWTs

Jingyuan Che (University of Electronic Science and Technology of China, China), Xiaofang Zhu (University of Electronic Science and Technology of China, China), Yulu Hu (University of Electronic Science and Technology of China, China), Quan Hu (University of Electronic Science and Technology of China, China), Bin Li (University of Electronic Science and Technology of China, China)

A simulation method of Graphite Heat Extrusion Process for high-frequency structure of helix STWT is proposed in this paper. The Graphite Heat Extrusion Process includes both the heating and the cooling process which cannot be simulated in a whole simulation, so we simulate them respectively in ANSYS Workbench. The model after heating is somewhat damaged and need to be repaired in ANSYS Workbench. The effects of the deformation on electrical characteristics of the high-frequency structure can be analyzed with Microwave Tube Simulator Suite (MTSS). Using this method, the working parameters of the Graphite Heat Extrusion Process can be evaluated, as well the performance of the manufactured high-frequency structure can be observed.