

## Session 5. TWTs-I

April 29 (Monday) / 13:30 ~ 14:50 / Room 2

Session Chair: Dave Abe (Naval Research Laboratory, USA)

13:30 ~ 13:50

### 5.1 / [Keynote] Development of a High Efficiency Coupled-cavity Traveling Wave Tube

Daxi Ji (Nanjing Sanle Group Co., Ltd, China), Ling Zhu (Nanjing Sanle Group Co., Ltd, China), Wanchao Huang (Nanjing Sanle Group Co., Ltd, China), Hang Tian (Nanjing Sanle Group Co., Ltd, China), Yun Chen (Nanjing Sanle Group Co., Ltd, China), Xirui Zhan (University of Electronic Science and Technology, China), Zhaoyun Duan (University of Electronic Science and Technology, China)

In this paper, an X-band air-cooled high efficiency traveling wave tube with coupled-cavity slow-wave structure and four-stage depressed collector was developed. The experimental results show that its average output power can reach more than 850 W and total efficiency is over 40% in the operating band (800 MHz). The X-band air-cooled high efficiency coupled-cavity traveling wave tube has met the requirements of airborne environment.

13:50 ~ 14:10

### 5.2 / Development of Miniaturized Linearized Channel Amplifier for Ku-Band LCTWTA

Bin ZHOU (China Academy of Space Technology ( Xi'an), China), Yan FANG (China Academy of Space Technology ( Xi'an), China), Bin HE (China Academy of Space Technology ( Xi'an ), China), Weibo HUANG (China Academy of Space Technology ( Xi'an ), China), Depeng BAI (China Academy of Space Technology ( Xi'an ), China)

In this paper, a miniaturized Linearized Channel Amplifier (LCAMP) is designed to reduce nonlinearity of traveling wave tube amplifier (TWTA), and realize channel gain setting and output power setting. LCAMP include the channel amplifier, linearizer and DC circuit. The each part is manufactured by advanced technology to realize low mass and small volume. The frequency band covers the typical Ku-band from 12.25 GHz to 12.75 GHz. This LCAMP has been manufactured and integrated into the Ku-band Linearized Traveling Wave Tube Amplifier (LCTWTA) to improve the linearity of TWTA, which will be in orbit.

14:10 ~ 14:30

### 5.3 / Highly Integrated Control Technology of Flexible LTWTA for Space Application

Bin He (China Academy of Space Technology ( Xi'an ), China), Junping Li (China Academy of Space Technology ( Xi'an ), China), Bin Zhou (China Academy of Space Technology ( Xi'an ), China), Weibo Huang (China Academy of Space Technology ( Xi'an ), China), Depeng Bai (China Academy of Space Technology ( Xi'an ), China)



Academy of Space Technology (Xi'an), China), Yukai Zhou (China Academy of Space Technology (Xi'an), China)

A highly integrated control technology for Flexible Linearized Travelling Wave Tube Amplifier (LTWTA) is proposed in this paper. This control technology has flexible and complete functions to achieve accuracy control effects, especially for the power adjustment range, which could be up to 3dB with 64 steps. Control module is optimized to fit response of TWT and to ensure drive security across the full flexible range. Moreover, the System In Package (SIP) circuit is designed to integrate nearly twenty chips and hundreds of resistors and capacitors, this distinct integrated package in control module realizes the miniaturization of the LTWTA product.

14:30 ~ 14:50

#### **5.4 / 160W L-band High Efficiency Space TWT**

Yiqun Liu (NANJING SANLE GROUP CO., LTD, China), Hongxia Cheng (NANJING SANLE GROUP CO., LTD, China), Xiaoran Zhang (NANJING SANLE GROUP CO., LTD, China), Xiaoyu Dong (NANJING SANLE GROUP CO., LTD, China), Yulu Hu (University of Electronic Science and Technology of China, China), Tao Huang (University of Electronic Science and Technology of China, China)

Nanjing SanLe Group CO., LTD has recently developed a high efficiency L-band TWT for space communication and navigation systems. The TWT is space qualified and can get a stable output power of 160W at efficiencies exceeding 68% with the bandwidth. And the nonlinear characteristics also meet industrial requirements. This paper gives the main technical characteristics of the TWT and the main performances (industrial batch) with the bandwidth in L frequency range.