Contribution ID: **1081** Type: **Oral**

MODELING STABILITY OF VACUUM ELECTRONIC DEVICES USING GENERALIZED IMPEDANCE MATRIX APPROACH

Thursday 27 June 2019 11:15 (15 minutes)

The new 2D code TESLA-Z [1] was developed at the US Naval Research Laboratory as a tool for geometry-driven large-signal modeling of linear-beam vacuum electronic devices (VEDs). The modeling approach is based on the representation of VED's structure as a generalized network of ports (including actual input/output ports and interaction gaps) whose frequency dependent properties (response) can be described by a generalized impedance matrix Z representing linear relationship between imposed currents and induced voltages at all gaps/ports. The impedance matrix Z can be pre-computed using a 3D Computational Electromagnetic (CEM) code and then utilized by the large-signal algorithm in TESLA-Z to model the VED beam-wave interaction. Due to the geometry-driven nature of the approach employed in the code TESLA-Z algorithm allows modeling of wide class of VEDs. The code was successfully validated by modeling a folded-waveguide traveling wave tubes (TWTs) and a multiple-beam klystrons (MBKs).
As a next step in the development of the code we are working on extending TESLA-Z algorithm to make it suitable for studying stability in various VEDs. We will discuss the latest advances in the development of the code TESLA-Z algorithms and will present preliminary results of our stability modeling using impedance matrix approach.

1. I. A. Chernyavskiy T.M. Antonsen, Jr., J.C. Rodgers, A.N. Vlasov, D. Chernin, and, B. Levush, "Modeling Vacuum Electronic Devices Using Generalized Impedance Matrices,"IEEE Transactions on Electron Devices, Vol. 64, No. 2, pp. 536-542, Feb. 2017.

*Work supported by the US Office of Naval Research

Authors: Dr CHERNYAVSKIY, Igor (Naval Research Laboratory); Dr VLASOV, Alexander (Naval Research Laboratory); Dr RODGERS, John (Naval Research Laboratory); Dr LEVUSH, Baruch (Naval Research Laboratory); Dr ANTONSEN, Thomas, Jr. (Leidos, Inc.)

Presenter: Dr CHERNYAVSKIY, Igor (Naval Research Laboratory)

Session Classification: 2.3 Slow-Wave Devices

Track Classification: 2.3 Slow-Wave Devices