INDUCTIVE OUTPUT TUBE MODELING AND SIMULATION CODE DEVELOPMENT

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The inductive output tube (IOT) is the preferred technology for a number of applications requiring tens to hundreds of kilowatts of RF power at UHF and L-band frequencies and has been proposed for applications requiring as much as a megawatt CW. Although conceptually simple, modeling and simulation of the physics of the electron beam formation region within the IOT input cavity presents a significant challenge due to the disparate scales of the components. To address the needs of manufacturers of high-power IOTs and support the development of high-power Multiple-Beam (MB) IOT technology, our team is developing the tools necessary to allow end-to-end modeling and simulation, and design optimization, of the beam-wave interaction of these devices. The finite-element time-domain electrostatic PIC code MICHELLE [1], in conjunction with the Analyst® [2] suite of electromagnetic codes, are undergoing extensive modifications to provide modeling capability of the cathode-grid-anode structure that comprise the input cavity, while the beam wave interaction of the output cavity will be performed using the code TESLA [3]. The latest results of this effort will be shown.

1. J.J. Petillo, et al., "Recent developments in the MICHELLE 2D/3D electron gun and collector modeling code", IEEE Trans. Electron Devices Sci., vol. 52, no. 5, May 2005, pp. 742-748.
2. The Analyst Code, http://www.staarinc.com.
3. I.A. Chernyavskiy,, A.N. Vlasov, T.M. Antonsen, S.J. Cooke, B. Levush, K. T. Nguyen, "Simulation of Klystrons With Slow and Reflected Electrons Using Large-Signal Code TESLA", IEEE-TED, Vol. 54, no. 6, pp. 1555–1561, June 2007.

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