

Abstract Submitted
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TWT Driven by a Large Diameter Annular Electron Beam in a Disk-on-Rod Slow-Wave Structure¹ P. WONG, D.H. SIMON, PENG ZHANG, Y.Y. LAU, R.M. GILGENBACH, University of Michigan, Ann Arbor, MI, B. HOFF, Air Force Research Laboratory — This paper studies the viability of a high-power traveling wave tube (TWT) using a disk-on-rod slow-wave structure (SWS), which admits a large diameter, high current, annular electron beam. The annular electron beam would achieve much higher current than a pencil beam. The cold-tube as well as the hot-tube dispersion relations are analytically studied and compared to numerical simulations. The Pierce gain parameter, C , is calculated by two very different methods: the exact formulation of the space-charge wave on the disk-on-rod SWS, and the calculation of the action of the beam on the operating circuit mode. Both methods yield identical results of C . The so-called Pierce AC space charge effect parameter, QC , is calculated rigorously for the first time for the disk-on-rod SWS TWT. Proof-of-principle experiment is designed based on the combined analytic and simulation studies.

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