Abstract Submitted for the DPP05 Meeting of The American Physical Society

Characteristics of an A6 Magnetron Using Transparent Cathode¹ SARITA PRASAD, H.L. BOSMAN, M.I. FUKS, E. SCHAMILOGLU, University of New Mexico — Relativistic magnetrons are attractive for many applications as the most compact sources of high power microwaves. However, the rather slow buildup of oscillations, which is dependent on the magnitude of the azimuthal electric field E_{θ} near the cathode surface, is a major drawback for applications in fields like nanosecond radar systems. The transparent cathode is a new cathode design in which longitudinal strips are removed from a hollow cylindrical cathode. This allows the E_{θ} field to penetrate to the center of the cathode, thus increasing the E_{θ} amplitude at the cathode surface. Computer simulations were performed with the 3D fully electromagnetic particle-in-cell code MAGIC, using the well-known A6 magnetron geometry. Dependences of the microwave output on the magnitude of the voltage and its rise time (for respectively instant turn-on and slow turn-on, relative to the electromagnetic fill time of the resonant system), show faster start of oscillations with the transparent cathode than with the traditional solid cathode. Magnetron operation with different configurations of the transparent cathode was studied to determine the optimal conditions for fast excitation of desired modes. These results together with dispersion characteristics will be presented.

¹Work supported by an AFOSR/MiPRI Grant

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Date submitted: 22 Jul 2005

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