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Mode Control Cathode Modeling and Experiments on a Recirculating Planar Magnetron[1] MATTHEW FRANZI, RONALD GILGENBACH, University of Michigan, BRAD HOFF, Air Force Research Laboratory, GEOFF GREENING, Y.Y. LAU, DAVID CHALENSKI, DAVID SIMON, PENG ZHANG, University of Michigan — We present simulations and experimental results of a new class of crossed-field device: Recirculating Planar Magnetron (RPM) [1]. Experiments on a 12 cavity, 1 GHz, RPM are underway using MELBA accelerator at -300 kV, 1-10 kA and pulselengths of 0.3-1 microsecond. A mode control cathode (MCC) is proposed to address RPM mode competition and cross-oscillator coupling. The MCC is a periodically spaced conducting network designed to act as both an electron source and a resonant electromagnetic coupler between the two planar RPM oscillators. MCC simulations have verified such mechanisms, resulting in faster mode development and phase locking in the RPM. Manipulation of the cathode's geometry has also been analytically established to enhance mode separation of the cold slow wave structure. Experimental frequency and phase measurements using the MCC will be presented.

[1] Gilgenbach et al., IEEE Trans PS 39, 980 (2011); also, patent pending.

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