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Mode Control and Extraction on the Recirculating Planar Magnetron MATT FRANZI, RONALD GILGENBACH, University of Michigan, BRAD HOFF, Air Force Research Labs, GEOFF GREENING, DAVID SIMON, NICHOLAS JORDAN, Y.Y. LAU, University of Michigan — Experiments on a 12 cavity, 1 GHz, Recirculating Planar Magnetron (RPM-12a) [1] are underway using MELBA accelerator at -300 kV, 1-10 kA and pulse lengths of 0.3-1 microsecond. A mode control cathode (MCC) has been designed and constructed 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 (MAGIC and ICEPIC) have verified such mechanisms, resulting in faster mode development and phase locking in the RPM. Manipulation of the cathode's geometry analytically enhances mode separation of the cold slow wave structure. Experimental frequency and phase measurements using the MCC on the RPM-12a will be discussed. Design and simulated results will also be presented for a new 12-cavity, 1.9 GHz RPM prototype, RPM-12c. This prototype will employ both the MCC and an axially oriented coaxial extraction line, which has been simulated to yield ∼450 MW at 60% efficiency when operated under approximately the same conditions as the RPM-12a. *Research supported by AFOSR grant#: FA9550-10-1-0104, AFRL, and L-3 Communications Electron Devices.

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

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