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Emitter Residual Gas Effects in a High Power Microwave System

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This paper presents experimental results from a repetitive pulse HPM-system, consisting of a marx-generator driving a coaxial vircator under high vacuum. The experiments were performed at starting vacuum levels in the high-vacuum range at pressure levels of safe operation for the system. Data was monitored of the vircator voltages and currents from the driving pulse generator, the vacuum levels, and the emitted microwaves from the vircator. The pulse generator measurements were made with Pearson current probes and capacitive E-field and magnetic B-dot probes by R.E. Beverly III & Associates. Vacuum was monitored using MKS residual gas analyser and inverted magnetron vacuum gauges. The emitted microwaves were measured using two free field Prodyn sensors. The experiments show how residual gases from parts in the vacuum tube increase the vacuum to levels which deteriorate vircator performance during operation. Higher pressures reduce power and duration of the microwave pulses. Ongoing experiments will be presented in the paper which show how actions which reduce residual gas pressures improve vircator performance, and how the impedance of the load changes during operation.

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