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Faceted Magnetron Device Using Discrete Current Sources¹ SULMER FERNANDEZ-GUTIERREZ, Boise State University, Boise, ID 83725, JIM BROWNING, Boise State University, Boise, ID 83725, DAVID SMITHE, Tech-X Corp., Boulder, CO 80303, JACK WATROUS, NumerEx, Albuquerque, NM 87106 — A faceted magnetron concept has a cathode structure comprised of field emitters instead of the traditional thermionic cathode. The faceted magnetron structure has been modeled using the 3D particle-in-cell codes VORPAL 5.2 and ICEPIC. The two-dimensional particle trajectory simulation Lorentz2E has been used to model the electron injection from gated field emitters in a slit type structure. The sensitivity of the electron injection into the device was studied using Lorentz2E with the variation in the operating voltages in the cathode structure -as well as the location of the pusher electrode. Volume electron charge was considered in the sensitivity analysis. Surface charge was not included. Together with this work a model of a ten cavity rising sun magnetron was developed using VORPAL 5.2. A cylindrical and pentagonal-shaped cathode was modeled to study the variation of results due to the cathode shape. The results of this model are used to compare with results obtained from ICEPIC. Discrete current sources were also modeled to come from each facet of the pentagon-shaped cathode to study its effect on the magnetron operation. It is planned to generate velocity distributions of the electrons for the VORPAL input by using results generated with Lorentz2E.

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