Abstract Submitted
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Experimental Research on a 1.5 MW, 110 GHz Gyrotron with a Smooth Mirror Internal Mode Converter[1] D.S. TAX, I. MASTOVSKY, M.A. SHAPIRO, R.J. TEMKIN, A.C. TORREZAN, MIT PSFC — Megawatt gyrotrons are important for electron cyclotron heating (ECH) of fusion plasmas, including ITER. These gyrotrons should operate with high efficiency to reduce the prime power required and to ensure good reliability. The gyrotron efficiency is affected both by the physical principles that govern the device and the performance of components like the internal mode converter (IMC), which must convert the electromagnetic cavity mode into a Gaussian beam. An IMC consisting of a helically-cut launcher and three smooth curved mirrors, which is less susceptible to alignment errors than an IMC using mirrors with phase correcting surfaces, was recently tested on a 1.5 MW, 110 GHz, 3μs pulsed gyrotron operating in the $TE_{22,6}$ mode, and an output beam with 95.8 ± 0.5 % Gaussian beam content was measured in both hot and cold tests. We are also examining the issue of mode competition in the gyrotron, which can limit the achievable output power and efficiency. The sequence of competing modes excited during the rise time of the voltage pulse has been measured and results are compared with the numerical simulation code MAGY. These results should provide a good test of the accuracy of the code.

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