MODE SELECTION FOR A 170 GHz, 1 MW GYROTRON*

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Gyrotrons are the leading microwave sources for plasma heating and current drive in magnetic confinement fusion experiments [1], [2]. In a gyrotron, a helical electron beam, formed by a MIG-type electron gun and guided by an external magnetic field, delivers energy to a RF electromagnetic wave (i. e. a TE mode supported by the interaction cavity) through electron cyclotron resonance. To design a gyrotron, a set of suitable candidate operating modes must be specified first. The modes should meet the performance requirements and obey several physical and technological constraints related to the electron gun, the interaction cavity and to voltage depression. Using a pertinent systematic procedure, we have come up with such a group of TE modes for a 170 GHz, 1 MW CW gyrotron, relevant to the ITER requirements. The results are presented, together with preliminary designs of the interaction cavity for the most promising operating modes.

References

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[2] K. Sakamoto, “Progress of high-power-gyrotron development for fusion research”, Fusion Science and Technology 52, 145 (2007).

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