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Design and Simulation Studies of Calorimetric Dummy Load for Gyrotron System

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High microwave power is generally measured and characterized by calorimetric dummy loads, which are designed to suit the exiting modes of the gyrotron / HPM. The output mode of the gyrotron is converted to a Gaussian mode-HE11 mode after passing through series of mode converters. The objective of this study is to design and fabrication of Calorimetric Dummy Load with efficient cooling medium which absorb maximum power of 200 kW at 42±0.2GHz frequency applied for 3 seconds, suited for microwave power propagating in HE11 mode. There is rigorous requirement of proper cooling channel or cooling medium over the dummy load system for the dissipation of heat in the quickest manner. As an effect of high microwave energy (maximum heat), internal heat buildup in the dummy load system which could results in a catastrophic failure or decrease in the life span of the dummy load. This research envisaged the thermal effect of microwave energy on a reflecting structure incorporated to transfer microwave energy to heat absorber media concatenating the effect of heat conduction via multi flow path technique. In this manuscript, CFD analysis using ANSYS has been carried out to find the temperature contour, velocity contour, pressure contour for water passing through the helical tubes and thermal analysis has also been carried out for reflecting medium and microwave absorber material inside the enclosure. Details of these analyses results and their optimizations will be discussed in this paper.

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