

Design and Analysis of Input and Output Couplers for 250 kW CW C-Band Klystron

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Abstract

Input and output couplings in a microwave tube are related to the coupling of the tube rf structure with the standard coaxial or waveguide output using well matched broadband impedance transformation section. Input and output RF couplings in microwave tubes are very significant for efficient and reliable operation of these devices. The slot coupling for feeding in the RF signal to the tube rf structure at the input and for extracting high rf output power from the tube to the output load is characterized by S-parameters, bandwidth, thermal and mechanical ruggedness.

The klystron is a microwave tube capable to produce very high power that find wide use in communication, radar, material processing , particle accelerators and thermonuclear fusion reactors. The RF section has an important role in deciding the RF performance of the tube, such as its gain ,band width, efficiency etc. The RF section is a integration of 6 numbers RF resonant cavities. The fabrication of cavities was carried out through machining of piece parts, brazing, and characterized through cold testing. Output section of klystron consist of reduce wave guide, step transformer and RF window assembly coupled with RF cavity. The coupling parameters loaded Q and VSWR are analytical calculated to match the cavity with output section

The simulation of input and output coupling carried out using CST microwave studio code. The analytical results are well matched with simulated results. An experimental assembly of RF cavity with output section fabricated. The paper presents the design and Characterization of Cylindrical RF cavity with Output section coupling and input coupling for a 250 kW CW C-band klystron being developed at CEERI Pilani.