

THE IMPROVED JET ITER-LIKE ANTENNA HIGH POWER PROTOTYPE*

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The JET ITER- Like ICRF Antenna High Power Prototype (HPP) has been constructed and tested at ORNL. The HPP is nearly identical to one quadrant of the actual JET antenna. The specifications for the JET antenna call for 10 s pulses coupling the full design power (7.1 MW) into a reference plasma load $R' = 4 \Omega/m$. This corresponds to approximately 40 kV peak on the antenna side of the internal matching capacitors, and 1200 A rms at the antenna grounds. The prototype has achieved these specifications for short pulses (50 ms), but overheating of two small regions of the antenna enclosure was observed during 10s pulses, which limited achievable currents and voltages in this case. Analysis revealed unexpectedly high current densities in these regions, resulting in high levels of dissipated rf power. They have since been modified to redistribute these currents. In addition, new current straps have been fabricated from a stereolithographic-ally produced pattern by investment casting, with the thickness of the outer edges increased from 2 to 6 mm. This has been done to limit temperature increases in these regions, in which the current density is also high. The modified antenna has been reassembled and re-installed in the ORNL Radio Frequency Test Facility (RFTF), and testing is expected to resume in the near future. In addition, a time dependent model of temperature distributions on the antenna structure has been produced with the engineering analysis code ANSYS, in order to check the efficacy of design modifications prior to testing. Current distributions used to specify power fluxes in this model arising from rf dissipation were calculated using CST Microwave Studio and the actual 3-D engineering CAD model. Results of these activities will be discussed in this paper.

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