

INTERPRETATION OF PISCES-A RF ANTENNA SYSTEM EXPERIMENTAL RESULTS WITH CIRCUIT SIMULATION*

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One aspect of the PISCES-Upgrade project is the inclusion of an RF ion heating system. The heating system will increase the ion energy from present 1–2 eV up to 10–20 eV to allow more realistic simulation of ITER divertor plasmas. To determine the most efficient method of converting RF power to electron and ion heating in PISCES-Upgrade, several different antenna types were tested in PISCES-A. Prior to construction of the RF ion heating system, models were developed to determine the heating system parameters. The RF antenna and drive tank circuit was designed and built with varying power matching capability based on these models and their performance predictions in the 1–2 ohm range of anticipated plasma loading. The RF plasma coupling experiments successfully used these models to find the optimal plasma launching conditions. During the experiments, we learned that the range of plasma loading was greater than anticipated. The best results were achieved with an 8 cm diameter 4-turn coil with $m=0$ azimuthal symmetry that produced 3–5 ohms plasma loading, and over 90% plasma coupling efficiency.¹ The test results are now being compared to the existing models and used in model development for future PISCES-A configurations.

¹D.A. Rothweil, E.E. Bowles, J.W. Cuthbertson, R. Doerner, R. Lehmer, A. Nerem, C.C. Petty, D.A. Phelps, R.D. Phelps, R.I. Pinsky, L. Schmitz, Bull. Am. Phys. Soc. **39**, (1994).

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