Improved Numerical Modeling of Lower Hybrid Experiments in the MST Reversed Field Pinch*

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Numerical work is under way to improve the modeling of lower hybrid (LH) wave injection experiments in the MST reversed field pinch for electron heating and current profile control in the outer region. This is prompted by recent experimental results including the observation of hard X-ray flux associated with 50-kW RF power launched from an interdigital line antenna in the MST[1]. The suite of codes being used consists of MSTFIT (2-D MHD equilibrium code), GENRAY (generalized ray tracing code) and CQL3D (3-D relativistic, bounced-averaged, quasi-linear, Fokker-Planck code). To increase the realism of the modeling we have incorporated in our Fokker-Planck simulations a radial transport term and a DC electric field term, both consistent with experiments, and an X-ray flux diagnostic routine. We have shown numerically that the LH wave at 800 MHz and $n_{||} = 8$ is indeed a viable choice for current drive in enhanced confinement discharges with the radial transport coefficient of $3 \sim 5$ m^2/sec. The hard X-ray energy spectrum of 10 keV or higher, however, was not reproduced by CQL3D and awaits an improved modeling of the behavior of the plasma near the antenna. Suggestions will be made to optimize the use of a new antenna which is designed to handle RF power up to 200 kW.

[1] J.A. Goetz, *et al*., Proceedings of the 15th Topical Conference on Radio Frequency Power in Plasmas (2003), pp. 263-266.

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