Interpretive Modeling of DIII–D Edge Measurements Using the OEDGE Code*

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To develop a better physics understanding of the edge plasma, an iteratively coupled code, OEDGE, is being developed and benchmarked against well diagnosed, simple plasmas. OEDGE (Onion-Skin Modeling + EIRENE + DIVIMP for edge analysis") is used for the interpretation of edge measurements made on magnetic confinement devices. EIRENE is a neutral hydrogen Monte Carlo code developed by Detlev Reiter, Juelich KFA. DIVIMP is an impurity neutral and ion Monte Carlo code. The Monte Carlo codes require a "plasma background" into which to launch particles. The Onion-Skin Modeling, OSM, code can provide such a background by solving the 1-D, along-**B**, plasma (fluid) conservation equations using across-**B** boundary conditions from experiment, e.g. I_{sat}^{+} and T_e across divertor targets from Langmuir probes, to produce a 2-D solution for the edge plasma (toroidal symmetry assumed). The OSM uses the Monte Carlo codes to provide the neutral hydrogen-related and impurity-related terms in the OSM's conservation equations.

The edge diagnostic set on DIII–D is probably the most complete of any magnetic confinement device, uniquely including a Divertor Thomson Scattering, DTS, diagnostic which, with magnetic sweeping of the divertor X–point, provides 2-D measurements of n_e and T_e throughout the divertor. In February 2001 a set of "Simple-as-Possible-Plasma," SAPP, (L–mode, attached), comprehensively-diagnosed discharges was run on DIII–D. First OEDGE results for these SAPP discharges will be presented.

For the lowest density SAPP shots, at $\bar{n}_e = 2.5\times10^{19}m^{-3}$, the plasma was attached at both inner and outer targets, making for a particularly simple edge. Agreement between the code results and the experimental data from the DTS, the upstream Thomson diagnostic, the spatially-resolved and absolutely-calibrated hydrogenic and carbon radiation from both the divertor and from the main chamber regions, is primarily within the experimental uncertainties, encouraging the view that the majority of the controlling physics has been included in the modeling, at least for these particularly simple edge conditions.

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