IMPROVING PLASMA SHAPING ACCURACY THROUGH CONSOLIDATION OF CONTROL MODEL MAINTENANCE, DIAGNOSTIC CALIBRATION, AND HARDWARE CHANGE CONTROL*

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With the advent of more sophisticated techniques for control of tokamak plasmas comes the requirement for increasingly more accurate models of plasma processes and tokamak systems. Development of accurate models for DIII–D power systems, vessel, and poloidal coils is already complete, while work continues in development of general plasma response modeling techniques. Increased accuracy in estimates of parameters to be controlled is also required. It is important to ensure that errors in supporting systems such as diagnostic and command circuits do not limit the accuracy of plasma parameter estimates or inhibit the ability to derive accurate plasma/tokamak system models. To address this issue, we have developed more formal power systems change control and power system/magnetic diagnostics calibration procedures. We have also integrated the development and maintenance of control system models with the diagnostics calibration and change control procedures. This paper discusses our approach to consolidating the tasks in these closely related areas. This includes, for example, streamlining calibration procedures through the development of new test equipment, defining criteria for when diagnostics should be recalibrated along with required calibration tolerances, and implementing methods for tracking power systems hardware modifications and the resultant changes to control models.

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