

Current Status of DIII-D Real-Time Digital Plasma Control*

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This paper describes the current status of real-time digital plasma control on the DIII-D tokamak fusion experiment. The digital plasma control system (PCS) has been in place at DIII-D since the early 1990's and continues to expand and improve in its capabilities to monitor and control plasma parameters. The PCS monitors over 200 tokamak diagnostics using a real-time data acquisition system capable of acquiring a new set of samples once every 60 μ s. This information is then used to feedback control a variety of parameters including plasma shape and position.

Several improvements to the PCS have contributed to the advancement and understanding of fusion energy science at DIII-D. Among the more recent of these improvements has been the successful incorporation of advanced techniques for reconstruction of plasma equilibrium parameters in real-time. An isoflux control method using these improved plasma parameter calculations has greatly enhanced the ability of achieving desired plasma targets on the DIII-D tokamak.

Future plans for the system include possible upgrades of the real time computers, further links to other DIII-D diagnostics, and joint collaborations with other tokamak experiments including Princeton's NSTX.

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