

Abstract Submitted
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Development of a reciprocating probe servomotor control system with real-time feedback on plasma position for the Alcator C-Mod tokamak¹ D. BRUNNER, A.Q. KUANG, B. LABOMBARD, W. BURKE, MIT PSFC — Reciprocating probe drives are one of the diagnostic workhorses in the boundary of magnetic confinement fusion experiments. The probe is scanned into an exponentially increasing heat flux, which demands a prompt and precise turn around to maintain probe integrity. A new linear servomotor controlled reciprocating drive utilizing a commercial linear servomotor and drive controller has been developed for the Alcator C-Mod tokamak. The quick response of the controller (able to apply an impulse of 50A in about 1ms) along with real-time plasma measurements from a Mirror Langmuir Probe (MLP) allows for real-time control of the probe trajectory based on plasma conditions at the probe tip. Since the primary concern for probe operation is overheating, an analog circuit has been created that computes the surface temperature of the probe from the MLP measurements. The probe can be programmed to scan into the plasma at various times and then turns around when the computed surface temperature reaches a set threshold, maximizing the scan depth into the plasma while avoiding excessive heating. Design, integration, and first measurements with this new system will be presented.

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