

Embedded Calibration System for the DIII-D Langmuir Probe Analog Fiber Optic Links

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This paper describes a technique for measuring offset and gain of 64 analog optical data links used for the DIII-D fixed Langmuir probes by embedding a reference voltage waveform in the link signal input before every tokamak shot. Langmuir probes (LP) are connected electrically to the tokamak plasma and require high voltage isolation. The digitizers and power supplies formerly have had isolated AC power and stored LP diagnostic data at vacuum vessel potential. Modern (post-CAMAC) data acquisition electronics provide faster sampling rates and longer data windows but are incompatible with the harsh environment in the tokamak experimental hall and must be located remotely with isolated data and control signals. One type of analog optical isolator (DC-10 MHz) has been successfully used at DIII-D but the DC offset and gain may change due to variations in temperature or fiber transmission. The embedded calibration system described here eliminates the gain and offset uncertainty and allows use of remote modern PCI based data acquisition electronics.

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