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6.15 Fiber-Optic Pulsed Polarimetry Measurements of DIII-D Poloidal Field

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Fiber optic pulsed polarimetry (FOPP) measures the magnetic field along an optical fiber by detecting changes in the direction of the polarization of laser light propagating through the fiber due to the Faraday effect. By observing the backscatter light as a function of time from specially prepared fibers with weak fiber Bragg gratings, it is possible to obtain both the time and spatial dependence of the field along the fibers. Single-mode optical fibers were installed in the poloidal direction on the outside of the thermal blanket on DIII-D. Light at 532 nm from a mode-locked Nd:YAG laser was injected into the optical fibers. The laser repetition rate was 895 MHz with a pulse length of <10 ps. The backscatter light was detected by high-speed avalanche photodiodes. Bandwidth limitations of the detectors resulted in a spatial resolution of approximately 2 cm. The detector system measures the Stokes components necessary to determine changes in the polarization of the backscattered light. A non-uniform spatial distribution of the poloidal field that varies during the shot is observed. The results will be compared with existing inductive probe data.Work supported by US DOE under Award No. DE-SC0009808 and DE-FC02-04ER54698.

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