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Development of a Digital Control for the Phase Contrast Imaging Alignment Feedback System[1] M. HIRATA, University of Redlands, A. MARINONI, J.C. ROST, E.M. DAVIS, M. PORKOLAB, MIT — The Phase Contrast Imaging diagnostic is an internal reference interferometer that images density fluctuations on a 32-element linear detector array. Since proper operation of the system requires accurate alignment of a CO2 laser beam on a phase plate, beam motion due to vibrations of the DIII-D vessel need to be compensated up to 1 kHz. The feedback network controlling the steering mirrors currently uses a linear analog controller, but a digital controller can provide improved stability performance and flexibility. A prototype was developed using an Arduino Due, a low-cost microcontroller, to assess performance capabilities. Digital control parameters will be developed based on the measured frequency and phase response of the physical components. Finally, testing of the digital feedback system and the required revisions will be done to achieve successful performance. This upgrade to the linear analog controller is expected to be used routinely on similar diagnostics in fusion devices, especially in view of restricted access to the machine hall.

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