

Abstract Submitted
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Flexible Tank Circuit Design and Digital Feedback Control Implementation for HIT-SI A.B. BOURDAGES, T.R. JARBOE, B.A. NELSON, University of Washington — Current drive in the HIT-SI spheromak has been primarily due to relaxation of injected helicity. The ability to couple the injected helicity's perturbation to the plasma during time scales comparable to the natural behavior of the plasma has been unattainable with previous hardware. Only recently, through novel tank circuit and digital feedback control upgrades, has this new regime of operation, including higher injector flux operation, and multiple available driving frequencies been realized. A tank has been designed and added to the flux circuit so that in combination with digital control, the machine will operate near resonance while avoiding large phase shifts during plasma loading. The Analog Devices Blackfin micro-controller-Linux-based digital feedback system has also been improved. Presently, multiple ADC input channels are now available for feedback algorithms, and latency has been improved down to 3 microseconds. These improvements allow for cycle-to-cycle phase control between injector flux and loop voltage circuits. Details of the changes to HIT-SI circuits, control systems, and preliminary results will be presented.

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