

Abstract Submitted
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Upgrades to Power Systems and Magnetic Field Coils in the Pegasus Toroidal Experiment¹ J.M. PERRY, M.W. BONGARD, M.R. BRADISSE, R.J. FONCK, B.T. LEWICKI, S.M. SWAGER, University of Wisconsin-Madison — A set of facility upgrades for Pegasus is currently underway to improve the control and performance of the power systems and the magnetic field coils, with the aim of increased helicity-driven current drive for non-inductive startup. The plasma current achieved through helicity injection goes as $\sqrt{I_{TF}I_{inj}}$, the toroidal field rod current and injector bias current, respectively. To increase this quantity, the toroidal field power system will be upgraded. Eight new high-current IGBT bridges will replace the 6 bridges currently in place, bringing I_{TF} from 288 kA-turns to 600 kA-turns. I_{inj} is increased via a new 14 kA, 2.2 kV, single-quadrant IGCT switching power supply. The main poloidal field coil system is expanded to provide faster vertical field penetration of the vessel wall, thereby providing more flexible control of plasma position during startup and current growth. The L/R time for these coils is reduced by $\sim 40\%$. New divertor coils are being installed to provide more shaping flexibility and separatrix-limited operations. Overall power supply control will be improved and simplified by deployment of digital feedback controllers using Field Programmable Gate Arrays (FPGAs) to replace PWM analog feedback controllers. FPGAs will provide faster control frequencies, improved fault-handling capability, and streamlined recording of power system operations.

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