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High Capacitor Bank Utilization with a Ćuk Converter¹ ALEX HENSON, TIMOTHY ZIEMBA, KENNETH E. MILLER, JAMES PRAGER, SATBEER SINGH, Eagle Harbor Technologies, Inc. — Eagle Harbor Technologies (EHT), Inc. is developing a Ćuk converter for local helicity injection and magnet driving and control for the Pegasus Toroidal Experiment at the University of Wisconsin – Madison. A Ćuk converter has low output ripple; high efficiency; voltage gain greater than one, allowing for deeper energy storage utilization; continuous power flow that lowers output EMI, reducing noise generation; continuous input and output current – energy flow from the series capacitor allows for greater control of the injector currents. Additionally, this configuration allows for series arrangements that isolate individual switch modules, so a failure does not potentially damage all solid-state switches. EHT has completed a Phase I program to design and build a high-frequency Ćuk converter, which was tested at Pegasus. EHT will present Phase I results showing increase capacitor bank utilization with a Ćuk converter. In a potential Phase II program, EHT will design, build, and test a bidirectional Ćuk converter that will reduce the heat load on electromagnet coils.

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