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A Hybrid Analog-digital Integrator for EAST Device

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A hybrid analog-digital integrator has been developed to be compatible with the long pulse plasma discharges on Experimental Advanced Superconductor Tokamak (EAST), in which a pair of analog integrators are used to integrate the input signal by turns to reduce the error caused by the leakage of integration capacitors, and the outputs of two integrators can be combined to construct a continuous integration signal by a Field Programmable Gate Array (FPGA) built in the digitizer. The integration drift is almost linear and stable in controlled temperature, so a period of typically 50 s is used to determine the effective drift slope, which is used to rectify the integration signal in real time. The data integrated in the internal FPGA can be directly transferred into the reflective memory installed in the same PCI eXtensions for Instrumentation (PXI) chassis. The test results show that the processed integration drift is less than 200 μ Vs during 1000 s integration, which will meet the accuracy of magnetic diagnostics in EAST experimental campaigns.

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