

**ARCHITECTURE AND TECHNOLOGY OF 500 MSAMPLE/S
FEEDBACK SYSTEMS FOR CONTROL OF COUPLED-BUNCH
INSTABILITIES**

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Feedback control of coupled-bunch instabilities presents many challenges. Control bandwidths up to 250 MHz are required to damp all of the unstable coupled-bunch modes in recent accelerators. A digital parallel-processing array with 80 DSPs has been developed to control longitudinal instabilities in PEP-II/ALS/DAFNE machines. Here we present a description of the architecture as well as the technologies used to implement 500 Msample/s real-time control system with 2000 FIR filtering channels. Since each processor has the ability to store data to a local 16 K-word dual-ported memory in parallel with feedback computations, a wealth of non-invasive diagnostics based on transient recording has been developed. Algorithms for feedback control, data acquisition, and analysis are described and measurements from ALS, DAFNE, and PEP-II are presented.