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The development of bunch-by-bunch transverse feedback system at SSRF based on RF direct sampling

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The commonly used bunch-by-bunch transverse feedback system is based on the scheme of analog down-conversion, which down converts the $3f_{RF}$ beam signal to the baseband with a phase adjusted local oscillator. The system contains a large number of analog devices, which make the system complex and vulnerable to environment changes. Today, sampling the high frequency signal directly with high performance ADC is available. A new bunch-by- bunch feedback system based on RF direct sampling is under development at SSRF. The new system structure is much simpler compared to the traditional one and much powerful. The direct sampling processor has 4 input channels, which can simultaneously process horizontal, vertical, large bunch vertical feedback, and bunch charge measurement. The RF processor has 4 ADC channels (maximum sampling rate is 2.6GHz, bandwidth is 9GHz), 4 DAC channels (maximum frequency is 500MHz). The processor uses Xilinx system-on-chip UltraScale+ MPSoC FPGA. Paper will introduce the system structure, the processor design and performance, FIR filter designing and preliminary tests.

Footnotes

Funding Agency

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Yes

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