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Low Frequency Ripple Current Attenuation for Slow Corrector Power Supplies in the APS Upgrade

Wednesday 13 August 2025 16:00 (2 hours)

As part of the Advanced Photon Source Upgrade (APS-U), approximately one thousand bipolar power supplies were installed to power the slow corrector magnets. During the APS-U commissioning, a 1Hz harmonic was detected in the beam motion. This harmonic originates from the 480V AC grid, caused by the booster ramping power supply operating at 1 Hz. The resulting grid disturbance introduced low-frequency ripples into both the corrector magnet power supplies and the L-Bend M1/M2 supplies, leading to the observed 1 Hz beam motion. This paper proposes two methods to mitigate these ripples in the corrector supplies: setpoint compensation using repetitive control, and regulation circuit adjustments through a simple jumper reconfiguration. The second approach was adopted and applied to all slow corrector magnet power supplies. Operational data showed that the low-frequency ripples were significantly attenuated in the corrector supplies, and in combination with fine-tuning of the L-Bend M1/M2 supplies, the 1 Hz beam motion was successfully eliminated.

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Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

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Yes

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