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Tracking error analysis on the power supply currents of J-PARC main ring main magnets

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The bending, quadrupole, and sextupole power supplies in the J-PARC Main Ring (MR) have been upgraded ramping up the average beam power for fast extraction (FX) operation for the neutrino oscillation experiment and slow extraction (SX) operation for the experiments in the hadron facility. The repetition cycles have been shortened from 2.48 sec. to 1.36 sec. for the FX operation and will be soon shortened from 5.2 to 4.24 sec. for the SX operation. The current ripples in the power supply generate the electric current errors of the main magnets. A tracking error can also generate the electric current deviation for the main magnets. A rather large tracking error has been observed after the power supply upgrade. An equivalent circuit analysis for the output load has been conducted to examine the cause. The impact on the beam optics for the longitudinal and transverse beam motions will be discussed. A manipulation of the power supply to improve the tracking errors is tried in the equivalent circuit analysis.

Footnotes

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Paper preparation format

LaTeX

Region represented

Asia

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