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High accuracy optics measurement in J-PARC MR for 1.3 MW upgrade plan

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J-PARC MR is a high intensity synchrotron that accelerates protons from 3 GeV to 30 GeV. In MR, beam study for 1.3 MW upgrade plan is now in progress. The upgrade is done by shortening the repetition period and increasing the number of protons, and it is crucial to understand their effects on beam motion. Especially, the betatron function is one of the most important parameters that determines the beam motion. In MR, the betatron function has been measured by using turn-by-turn signal of the beam position monitor. Betatron function has been adjusted to match with model within 3% accuracy in relative error in low energy period. However, in evaluating the effects of space charge forces and eddy currents on beam optics whose impact will be largen by the upgrade, the accuracy of betatron function measurement during the injection and acceleration period will be even more important. In this study, we have attempt to match betatron function to model within 1% accuracy in relative error both in injection and acceleration period which has never been achieved in MR, by performing beta function measurement using COD response from the steering magnets in MR.

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Footnotes

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Yes

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