Contribution ID: **1664** Contribution code: **THPM016** Type: **Poster Presentation**

Neural networks approach for controlling a waveform pattern of the paint bump power supply at J-PARC RCS

Thursday 5 June 2025 15:30 (2 hours)

Four horizontal paint bump magnets and two vertical paint bump magnets are used for the painting injection to produce a high intensity beam at J-PARC RCS. These paint bump power supplies are composed of the IGBT chopper units, and so the requirement waveforms can be controlled with high precision less than 1%. By using software that automatically creates input voltage (IV) patterns according to the characteristics of the power supply and direct manual adjustment of IV patterns, the current deviation of the painting pattern (PP) is less than ±0.2%.The adjustment of one PP needs about one hour and several days to adjust a total of 90 patterns with six paint bump magnets. Therefore, a reduction in adjustment time is required. In addition, to mitigate the beam loss caused by beam orbit control to a minimum level, we would like to realize a more precise current deviation. To adjust for these PP, we performed neural networks (NN) approach. By learning the IV patterns and output current patterns as training data, the highly accurate IV patterns were confirmed.The presentation reports on the preliminary training results using NN.

Footnotes

Paper preparation format

Word

Region represented

Asia

Funding Agency

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Session Classification: Thursday Poster Session

Track Classification: MC6: Beam Instrumentation and Controls,Feedback and Operational Aspects: MC6.D13 Machine Learning