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BPM displacement measurement and prediction at HLS II

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The beam orbit stability is a crucial indicator to evaluate the performance of the synchrotron radiation source. It can be improved through precise orbit measurement by beam position monitors (BPM) and appropriate orbit feedback. The movement of BPMs directly affects the measurement of the beam orbit and indirectly affects the beam orbit through orbit feedback system. Two sets of BPM displacement measurement systems with nanometer resolution were established at HLS II to measure the BPM displacement and analysis the related factors. According to these measurement results, the variation of the beam current and the vacuum chamber temperature is correlated with BPM displacement. Combining the ideas of machine learning and physical principles, a neural network for predicting the BPM displacement was designed and trained, which will be used for unmeasured BPMs. Associated with OFB system, the beam orbit deviation due to BPM displacement will be corrected and the local beam orbit stability can be satisfied.

Footnotes

Funding Agency

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Yes

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