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Online position conversion factor calibration study for BPM system

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Transverse beam position is one of the most critical parameters in accelerator commission and operation. As non-invasive diagnostic devices, beam position monitors (BPMs) are the main "workhorse"in accelerators, providing beam center of mass position information. The position conversion factor (K-factor) of BPM systems constitutes a fundamental determinate of measurement accuracy. While precision calibration traditionally relies on moveable calibrate platforms, the prohibitive cost of equipping each BPM with a dedicated two-dimensional calibration platform remains a widespread practical constraint. In this paper, an innovative online calibration method that synergizes machine learning with beam response matrix analysis to achieve per-BPM K-factor determination is introduced. The preliminary beam experiments have been carried out at Shanghai Soft X-ray Free-Electron Laser (SXFEL) facility. The proposed method offers a robust and resource-efficient calibration solution, particularly advantageous for cavity BPM systems where conventional approaches such as theoretical calculation and offline wire scanning, fail to provide reliable results.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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