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Parallel quadrupole modulation for fast beam-based determination of magnet centers

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A method to simultaneously determine the magnetic centers of multiple magnets with beam-based measurements is proposed. Similar to the quadrupole modulation system (QMS) method that is widely used for beam-based alignment measurement, the strengths of the group of selected magnets are modulated. The orbit shifts induced by the modulation are used to deduce the kicks applied at the magnet locations with the help of orbit response matrix calculated with the lattice model. By varying the beam orbit at the magnets, with a pair of corrector of magnets or local orbit bumps, and repeating the modulation measurement at each orbit, the magnet centers can be determined through fitting the calculated kicks versus the beam orbit. Demonstration of the method on a storage ring is presented. The method can also be applied to nonlinear magnets.

Footnotes

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Paper preparation format

LaTeX

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North America

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