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Machine learning applications for orbit and optics correction at the Alternating Gradient Synchrotron

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The Alternating Gradient Synchrotron (AGS) is a particle accelerator at Brookhaven National Laboratory (BNL) that accelerates protons and heavy ions using the strong focusing principle. In this work, we perform simulation studies on the AGS ring of a machine error detection method by comparing simulated and measured orbit response matrices (ORMs). We also present preliminary results of building two machine learning (ML) surrogate models of the AGS system. The first ML model is a surrogate model for the ORM, which describes mapping between orbit distortions and corrector settings. Building a self-adaptive model of ORM eliminates the need to re-measure ORM using the traditional time-consuming procedure. The second ML model is an error identification model, which maps the correlation between measurement errors (differences between measurement and model) and sources of such errors. The most relevant error sources for the error model are determined by performing sensitivity studies of the ORM.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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