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Modeling of the SIRIUS fast orbit feedback control loop

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The SIRIUS Fast Orbit Feedback system was put into routine operation for users in 2022. Recently, efforts have been made to study the coupling between the horizontal and longitudinal plane dynamics of the FOFB and LLRF feedback loops, an issue increasingly important in 4th generation synchrotron light sources operating with low synchrotron frequencies. New system identification experiments were conducted to develop an accurate black box MIMO model of the feedback loop. The high frequency response discrepancies among several fast corrector magnets are captured in this model and allow prediction of closed loop behavior, which is especially important for designing high gain controllers. This paper describes the obtained model, its validity and enabled improvements on the feedback loop performance and robustness.

Footnotes

Funding Agency

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Yes

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