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Online estimation approaches to fault-tolerant control of orbit stability at Siam Photon Source

Thursday 5 June 2025 15:30 (2 hours)

A novel approach combining online unknown input estimation with reconfigurable control has been developed to enhance orbit stability in the Siam Photon Source (SPS) storage ring. These unknown inputs, representing disturbances or uncertainties in the dynamic system, provide valuable insights for achieving robust control. Disturbances such as noise, temperature changes, and modeling uncertainties affecting the control variables can be treated as fault signals, allowing the application of fault estimation and compensation techniques from Fault Diagnosis (FD) and Fault-Tolerant Control (FTC) theories. The initial implementation of this slow orbit feedback (SOFB) system has significantly reduced X-Y orbit fluctuations while maintaining robust control stability against temperature disturbances in the SPS storage ring. This presentation will cover the FD/FTC principles, hardware, software, commissioning results of the current SOFB system, and plans for future developments.

Footnotes

Paper preparation format

Word

Region represented

Asia

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