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Particle tracking simulation and semi-analytical Vlasov calculation of CSR induced microbunching instability in a non-symmetric S-type four-dipole bunch compressor chicane

Monday, 20 May 2024 16:00 (2 hours)

Coherent synchrotron radiation (CSR) induced microbunching instability (MBI) has been an issue in the multi-bend design for a single-pass high-brightness electron beam transport. Recently a novel design of a non-symmetric four-dipole bunch compressor chicane has been proposed to effectively mitigate the CSR-induced emittance growth, compared with the symmetric C-type chicane widely used in present linac-FEL facilities. In this paper we perform a particle tracking simulation of the CSR-induced microbunching instability in a generic four-dipole chicane using ELEGANT. The results are compared and found consistent with the semi-analytical Vlasov calculation. The results provide a solid support for effectiveness of suppressing MBI in a non-symmetric S-type four-dipole bunch compressor chicane.

Footnotes

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Primary author: LIU, Bingxi (Huazhong University of Science and Technology)

Co-author: TSAI, Cheng-Ying (Huazhong University of Science and Technology)

Presenter: LIU, Bingxi (Huazhong University of Science and Technology)

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