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A Systematic Approach to Obtain Reliable Wake Functions from CST-calculated Wake Potentials for Multi-particle Simulations

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Bunch compressors are frequently employed to boost beam brightness in accelerator facilities such as e+e- linear colliders and free electron lasers (FELs). However, the energy chirp or correlated energy spread introduced into the beam by the chirper linac remained after bunch compression is undesirable in some applications. Wakefield structures known as dechirpers are designed to manipulate electron distribution in longitudinal phase space to remove the associated energy spread of the compressed bunches. In this report, we present our studies by using planar dielectric-lined waveguide (DLW) as a compact and effective dechirper for removing of drive beam energy chirp in NSRRC EUV FEL facility and the development of a systematic approach to obtain an appropriate wake function for simulation of multi-particle dynamics from the wake potentials of a general structure calculated by commercially available codes-CST. The wake function of dechirper extracted by proposed process was consistent with analytic wake function. This wake function of dechirper combined with ELEGANT or ImpactT shown the 45keV/m of energy spread will be removed after the operation of round DLW dechirper.

Footnotes

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