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Simulation Study of a Dielectric Beam Energy Dechirper for the Proposed NSRRC EUV FEL Facility

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In this report, we present a simulation study of dielectric beam energy dechirper designed for the proposed NSRRC EUV FEL facility. As revealed from ELEGANT simulation of the high brightness driver linac system, a residual energy chirp of about $42 \text{ keV}/\mu\text{m}$ is left after bunch compression. It can be corrected by a capacitive dechirper structure when the bunch is slightly over-compressed. We successfully used a 1-m long corrugated pipe to remove the residual energy chirp in such simulation. However, in order to save space and for a simplified mechanical design, we consider also the usage of two orthogonally oriented planar dielectric-lined waveguide (DLW) structures to remove residual energy chirp after bunch compression. Wake fields due to this DLW dechirper has been calculated by CST code and the deduced wake function will be used in particle tracking using ELEGANT.

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