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Evaluation of top-up injection by a single nonlinear kicker in Taiwan Photon Source

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The existing conventional bump-based injection scheme at the Taiwan Photon Source (TPS) causes considerable disruption to the stored beam, which proves to be unacceptable for certain synchrotron radiation beamlines and the future upgraded TPS with a small dynamic aperture. This article focuses on the evaluation of the nonlinear injection scheme, considered as one of the candidates for transparent top-up injection at the TPS, across three distinct phases. During the initial two phases, the configuration of the booster-to-storage-ring transfer line remains unchanged. Consequently, the coexistence of the current bump-based injection and the nonlinear injection methods within the system is maintained, with the former serving as a backup scheme. Notably, in the second phase, a crucial modification involves replacing the existing septum with a movable septum, providing increased flexibility in selecting the location of the kicker. Finally, in the third phase, a new booster-to-storage-ring transfer line is introduced. This redesigned layout situates the injection point near the end of straight section, facilitating the potential installation of at least one insertion device. This strategic placement aims to enhance the availability of radiation sources, catering to the diverse needs of users.

Footnotes

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