

Design and commissioning of the asymmetric beam optics in the SSRF storage ring

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Lattice upgrade, consisting of replacing the conventional bending magnets with super-bend locally, constructing two double-mini-bend optics (DMB) and installing a superconducting wiggler (SCW), was implemented in the Beamline-Project of Shanghai Synchrotron Radiation Facility (SSRF). The symmetry of the SSRF storage ring was completely destroyed, forcing the global optics to be modified. The lattice of the new SSRF storage ring, matching the new elements perfectly, was designed. Sufficient dynamic aperture and energy acceptance were obtained by elaborate lattice design and nonlinear optimization. Study on beam dynamics, including the closed orbit correction, the linear optics correction, the coupling correction, the chromaticity correction and the nonlinear dynamic optimization, achieved good results for the new lattice. The critical step in the study is the restoration of the linear beam optics, which greatly restored the machine performance. The resulting beam parameters, as well as the operation status, are also presented.

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