Orbit correction by the eigenvector method with constraints for ERL light sources

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Orbit correction in an ERL(energy recovery linac) is more complicated than those of an ordinary linac and a transport line, because the ERL beam passes a straight section containing main superconducting cavities at least two times with different energies. An orbit corrector in this section generally gives a different kick angle to the beam in a different turn. Therefore a sophisticated orbit correction method is required for ERLs. The eigenvector method with constraints (EVC) can perform global orbit correction under constraint conditions and as a result it has both functions of global and exact local orbit corrections[1]. This method was proposed for orbit correction mainly in storage-ring based SR sources and its usefulness was successfully demonstrated in the PF-ring and PF-AR[2]. In this presentation, we apply this EVC method to orbit correction in ERLs and we show from simulation results of orbit correction for the compact ERL that this method is applicable and very useful for orbit correction and stabilization in ERL light sources.

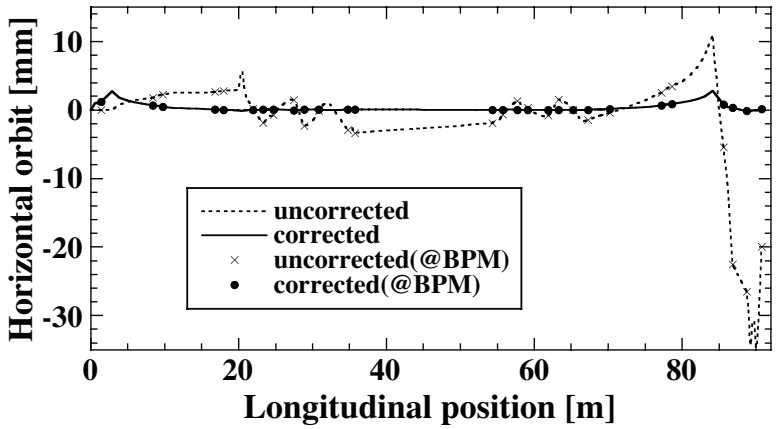

Figure 1: Simulated orbits in the compact ERL before and after correction by the eigenvector method with constraints. The orbit distortion before correction is generated by 1-mm alignment error of the main superconducting cavities. Symbols are horizontal positions at BPMs(beam position monitors) used for correction.

[1] N. Nakamura et al., Nucl. Instr. Meth. A 556 (2006) 421-432.
[2] K. Harada et al., Nucl. Instr. Meth. A 604 (2009) 481-488.