

THE PRESENT STATUS OF THE LATTICE DESIGN
FOR KEK PHOTON FACTORY STORAGE RING

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1. Linear lattice

The original linear lattice has been described in the reference.¹⁾ The horizontal phase advance in a normal cell is altered from 120 deg. to 90 deg. in the first modified lattice so that the third integer resonance excitation may become smaller. Under consideration are the further modifications which are mainly intended to control the dispersion function.

2. Sextupole magnets configuration

The sextupole magnets are distributed among the linear components so as to compensate the linear tune spread caused by the momentum spread. Two ways of the distribution are studied. In one way, two sets of sextupole magnets are installed in every normal cell. In the other way, all sextupole magnets are excited independently in a superperiod.

3. Higher order beam behavior

The equilibrium orbits for the off momentum particles are calculated over the range of $\pm 1\%$ including the sextupole field effect. The nonlinear tune shift and the variation of the amplitude function are examined also.²⁾ The third integer resonances excited by the correcting sextupoles are estimated for the injection stage where the horizontal beam size is maximum.³⁾ Also, the calculations are done including the fringe field effect of the bending magnets as the thin sextupole lenses.⁴⁾

4. Random errors

The closed orbit displacement and the half integer stopband are estimated from the assumed values of the random errors. As the random errors are considered the strength error and the tilt angle of the bending magnet and the setting error and the strength error of the quadrupole magnet.

References

- 1) S. Kamada, Y. Kamiya and M. Kihara, "Lattice Design of KEK Photon Factory Storage Ring", KEK-77-16 (1977).
- 2) Y. Kamiya, "Dispersion and Betatron Functions in Nonlinear Lattice - Computational Method and its Results -", this conference.
- 3) K. Takayama and M. Kihara, "KEK PF Storage Ring Injection", KEK-77-23 (1978).
- 4) S. Kamada, Y. Kamiya, M. Kihara and A. Ando, "Higher Order Beam Behavior due to Sextupolar Field Error", to be published.