Synchrotron

We measured the tune values of the stored beam with a real-time spectrum-analyzer during the beam present in the synchrotron. The field strengths of the lattice magnets are ramped parallel with increasing the beam energy and the exciting current patterns of the quadrupole magnets were adjusted to be constant values following the observed tunes. The single bunched beam is formed during a flat-bottom period of a cyclic acceleration stage using an rf knockout (RF-KO) system [1]. To leave electrons in the desired bunch and remove those in the neighbor ones, the undesired ones were kicked out by the RF-KO system with the synchronized frequency toward the vertical tune. The single-bunch impurity, which is defined as the ratio of the counting number of emitted photons from the electrons in a satellite bunch to that in the main bunch, was measured by the photon counting method with a fast light shutter, which was installed in the storage ring. A single-bunch impurity of less than 7×10^{-8} was achieved. In near future, a single-bunch beam will be formed at any energy at which the wide distributions of some beam parameters at the flat-bottom are expected to be decreased the width effectively. We began to study acceleration pattern with an energy-constant region (flat-middle pattern). With these patterns, we observed the beam orbits and the tune values at some beam energies between 1GeV and 8GeV with the energy step of 1GeV [2].

We installed additional high-accuracy current transformers on the power supplies for the dipole and quadrupole magnets in August of 1999 [3]. In order to estimate tune fluctuations during the long-term, excitation current fluctuations of the dipole and quadrupole magnets were measured by these transformers.

Beam parameters of the synchrotron (injection and ejection efficiencies, closed orbit distortion, dispersion and chromaticity) were observed at regular intervals from June 1999.

The vertical positions of the quadrupole magnets were observed and the magnets sunk as shown in Fig. 1. These position changes of the quadrupole magnets do not influence beam operation, however we began to develop a real-time monitoring system for the magnet movements.

References

[1] H. Suzuki *et al.*, SPring-8 Annual Report 1997 (1997) 160.

[2] K. Fukami *et al.*, SPring-8 Annual Report 1999 (1999).

[3] K. Fukami *et al.*, SPring-8 Annual Report 1999 (1999).