# AUTOMATED BEAM POSITION CONTROL IN THE ESRF STORAGE RING

*Laurent Farvacque*
ESRF, Grenoble, France

**Abstract**

Beam stability as a strong impact of the performance of a Synchrotron Radiation source like ESRF. An excellent resolution in the beam position control is imposed by the small beam dimensions at the source points (10 m rms in the vertical plane) while the stability is affected by the strong thermal effects linked with the beam intensity variations between the refills. It appears clearly that the largest perturbations correspond to slow fluctuations (24 hours?) so the correction was separated between slow corrections (every 30 seconds) and fast correction (up to 100 Hz). The slow correction is performed by a fully automated orbit correction program running every 30s. It uses 224 Beam position monitors (BPM) and 96 steerers in each plane. It is based on a SVD algorithm chosen for its flexibility in

- optimizing the compromise between correction efficency and sensitivity to BPM drifts,
- dealing with failing BPMs or steerers.

The response matrix may be or measured experimentally for routine tunings or theoretically derived from the model of the machine for experimental tunings. Special care is taken in using experimental calibrations of BPM offsets and of BPM drifts with beam intensity. The fast correction is performed by a fast global feedback system acting in the vertical plane only and using 16 BPMs anf 16 steerers. The crosstalk with the slow system is avoided by canceling the DC response of the feedback system, meaning that this system may safely ignore the slow drifts of its sensors.