

Using an in-situ field measurement system to measure the magnetic field of the in-vacuum undulator

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Two 2-meter-long in-vacuum undulators with period of 22mm (IU22) are constructed to be installed in the 3-GeV TPS (Taiwan Photon Source) to provide high brilliance light source at hard X-ray energies. To finally check the IUs' magnetic field before installed in the storage ring, we have constructed an in-vacuum magnetic field measurement system. All components of the system are high vacuum compatible to avoid contaminating the vacuum chambers. During actuation along the longitudinal direction, the Hall sensor positions are monitored by optical devices and corrected by three two-axis stages. Position deviations of the Hall sensor are less than 10 micrometers. The phase error measuring system reproducibility of this system is 0.2 degree and the deviations of magnetic field strength are less than 0.03%. We use this system to measure the magnetic performance of the in-vacuum undulator at different magnet array gaps. The measuring results show that there is no significant difference after assembling the magnet arrays inside the chamber. The design and construction details of the in-vacuum magnetic field measurement system are described together with the magnetic field measuring results of the field measurement in this presentation.