Optimization of EPU6 Undulator at PLS


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Pohang Accelerator Laboratory (PAL) is developing an Elliptically Polarized Undulator (EPU) to utilize the polarized synchrotron radiation at Pohang Light Source (PLS). EPU6 is a Apple-II type elliptical undulator[1], which changes the polarization of the field by translating the quadrants arrays. PLS EPU6 features period of 6 cm, minimum gap of 18 mm, 25 full field periods, maximum vertical flux density of 0.69 Tesla, maximum horizontal flux density of 0.46 Tesla, and 1575 mm total magnetic structure length. EPU6 is optimized for highly polarized synchrotron radiation in 80 eV to 1500 eV at 2.0 GeV electron energy.

PLS EPU6 is “virtual shimmed” meaning that the blocks are moved to different positions instead of using ferromagnetic shims. The procedure is time consuming but it has an advantage that the usable undulator gap is not changed and the shimming effects remains for larger gap. The $rms$ random errors are measured to be 20G which is 0.29% of the peak field at planar mode. The optical phase errors reached maximum of 6° for circular polarized mode. The spectrum calculation based on the measured field shows that PLS EPU6 is achieving about 70% of the ideal spectrum at 5th harmonic.

In this article, the measurements, optimization and electron beam commissioning efforts for the EPU6 are described.

References


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