Development of a Novel Undulator with a Very Short Period Length and the First Light Observation

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We are exploring a novel method to fabricate undulator magnets having a very short period. Here, "very short period" means periods one order-of-magnitude shorter than the ordinary period of several cm. Two types of the magnet plates 100mm and 152mm long with 4-mm period length have been successfully fabricated[1-3]. A connection method of these magnet plates has also been successfully developed to fabricate longer undulator magnets[4]. Prototype undulators based on these technologies have been constructed.

Magnetic field measurements and field characterization based on the measured field show that the quality of the undulator field of these magnet plates is satisfactory, and a spectrum calculation shows that the fundamental radiation emitted from this field is quite satisfactory in spectrum quality as compared to that for the ideal field.

Test experiments for light generation using the real electron beam based on two kinds of sources are being prepared. One is being planned at an S-band linac of the Tohoku University, and the other is at an experimental site for a laser wake field acceleration in SPring-8/RIKEN. A preliminary result of the first light observation made at the Tohoku University S-band linac will be presented.

References

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