Contribution ID: **257** Type: **talk**

Development of a Novel Undulator with a Very Short Period Length

Wednesday, 27 September 2017 18:15 (15 minutes)

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.They produce an undulator field of approximately 4kG at a gap of 1.6mm. A connection method of these magnet plates has also been successfully developed to fabricate longer undulator magnets. Prototype undulators based on these technologies have been constructed.Field measurements and characterization show that the quality of the undulator field of these magnet plates is satisfactory for a very short period undulator, and a spectrum calculation shows that the fundamental radiation emitted from this field is quite satisfactory.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 Tohoku University in Japan, and the other is at an experimental site for a laser wake field acceleration in SPring-8/RIKEN under the ImPACT program.

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Session Classification: WG4_Parallel

Track Classification: WG4 - Applications of Compact and High-Gradient Accelerators