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## High precision digital control magnet power supplies

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We developed high-precision digital control magnet power supplies (MPSs) aiming at next-generation light sources such as SPring-8-II. The system consists of a high-precision ADC circuit and an FPGA that processes a proportional-integral control and pulse-width-modulation. Using the system, the current ripple and long-term stability (8 hours) of the MPS are controlled within 20 ppm. The MPS can be made to fit various magnets by readily adjusting feedback parameters. We also developed functions of a pattern mode and a multi-channel synchronization. In the pattern mode, the output current comes in a 0.5 Hz sine-wave that can be applied to a beam-based alignment and other purposes. The multi-channel synchronization can precisely synchronize the timing of three outputs for 6-pole steering magnets etc. The newly develop MPSs have been introduced to the next-generation 3 GeV light source, NanoTerasu, in Japan. There, large current MPSs with 50 - 650 A are used for family magnets, and DC-link type MPSs with +/-5 - 20 A are used for steering magnets in the storage ring, and various magnets in the injector linac. We will report an overview and performances of MPSs.

### Funding Agency

### Footnotes

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Yes

**Primary author:** KONDO, Chikara (Japan Synchrotron Radiation Research Institute)

**Co-authors:** TANIUCHI, Tsutomu (Japan Synchrotron Radiation Research Institute); WATANABE, Takahiro (Japan Synchrotron Radiation Research Institute); FUKUI, Toru (RIKEN SPring-8 Center); NAKAZAWA, Shingo (SPring-8 Service Co. Ltd.); FUKAMI, Kenji (Japan Synchrotron Radiation Research Institute (JASRI)); NISHIMORI, Nobuyuki (National Institutes for Quantum Science and Technology); TANAKA, Hitoshi (RIKEN SPring-8 Center)

**Presenter:** KONDO, Chikara (Japan Synchrotron Radiation Research Institute)

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