

APP4-2

Development of a High Temperature Superconducting Transformer for a 1 kA - 1 kHz Class Compact Power Supply

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We have been developing a compact power supply with a single-phase high temperature superconducting (HTS) transformer [1-3]. Our goal is to develop the variable voltage variable frequency power supply with a rated frequency of 1 kHz and rated current of 1 kA. We have achieved 1 kHz-850 A class HTS transformer so far [4]. The transformer had some leakage inductance and therefore the maximum output current was limited to 850 A. In this presentation, we report an HTS transformer with less leakage inductance based on the structural study of the transformer and the 1 kHz-1 kA class power supply. In addition, we will report a protection system for normal transitions in the 1 kHz-1 kA class HTS transformer.

[1] N Nanato, S Tanaka and S Tenkumo, Study on a Magnetic Flux Detection Coil for Detection of Normal Transitions in a Hybrid Single-phase Bi2223 Superconducting Transformer by the Active Power Method, *Journal of Physics: Conference Series*, Vol. 1054, 012070 (2018)

[2] N Nanato, T Ono, T Adachi and T Yamanishi, Protection System for Normal Transitions in a Single-phase Bi2223 Full Superconducting Transformer by the Active Power Method under Flowing Currents of Various Frequencies, *Journal of Physics: Conference Series*, Vol. 1054, 012068 (2018)

[3] N Nanato, N Kishi, Y Tanaka and M Kondo, Basic study for a large AC current supply with a single phase air-core Bi2223 high temperature superconducting transformer, *Journal of Physics: Conference Series*, Vol. 871, 012101 (2017)

[4] T Adachi, N Nanato, T Yamanishi, Development of Single-phase Bi2223 High Temperature Superconducting Transformer with Protection System for High Frequency and Large Current Source, *Journal of Physics: Conference Series* (in press)

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