MT29 Abstracts and Technical Program



Contribution ID: 263

Type: Poster

Thu-Mo-Po.09-06: Superconducting-compensated DCCT large current measurement technique for high-temperature superconducting cables

Thursday 3 July 2025 08:45 (2 hours)

In view of the challenges such as small range, low accuracy and weak tracking ability in current measurement of high-temperature superconducting cable for ultra-high field magnets, a high precision and fast response current measurement scheme based on core coil improvement and superconducting coil compensation is proposed. A DCCT high-temperature superconducting compensation coil has been designed, extending the static current measurement range to the hundred-thousand ampere level, thus enabling the measurement of large currents at this level. Additionally, the control circuit has been optimized, incorporating Hall current sensors as a feedforward element, resulting in a high-precision, fast-response current measurement system with complementary advantages. Furthermore, DCCT magnetic shielding technology suitable for complex electromagnetic environments has been developed, and the geometric design has been optimized to avoid magnetic core saturation caused by busbar eccentricity. A preliminary laboratory-scale DCCT prototype capable of measuring current levels of 20 kA has been developed. It is designed to achieve current measurements of 20 kA under a background magnetic field of beyond 10T, with a precision of less than 200 ppm. It is promising to provide effective technical means for accurate and rapid measurement of large currents in ultra-high magnetic fields.

Authors: LU, Jin (Shanghai Jiao Tong University); WANG, Yawei (Shanghai Jiao Tong University)

Presenter: LU, Jin (Shanghai Jiao Tong University)

Session Classification: Thu-Mo-Po.09 - Conductor and Coil Measurement/Test Techniques and Facilities II