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Tue-Mo-Po2.12-08 [106]: Design, Fabrication, and Testing of a YBCO Racetrack Coil for an HTS Synchronous Motor with Brushless Exciter

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An experimental platform of high temperature superconducting (HTS) synchronous motor with brushless HTS flux pump exciter has been designed and built. The support structure of HTS field windings was designed with a cantilever beam and was manufactured. In this paper, an HTS racetrack coil wound with YBCO tapes was designed and fabricated to verify the reliability of the motor employing a brushless exciter. The brushless HTS exciter was designed to be used as DC power supply to inject large currents into the HTS field coils, which eliminates the slip ring in the motor and avoids thermal load from current leads. The coil was mounted to support structure enclosed in the thermal shield and tested to check performance at an operating temperature of about 30 K. The test results show that the racetrack coil has excepted thermal and electrical stabilities. Finally, the test at this stage verifies the feasibility and reliability of HTS synchronous motor with brushless HTS flux pump.

Authors: Mr GAO, Yunfei (Sichuan University); Dr WANG, Wei (Sichuan University)

Presenter: Dr WANG, Wei (Sichuan University)

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