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Mon-Af-Po1.22-02 [102]: Design and Evaluation of Prototype High-Tc Superconducting Linear Synchronous Motor for High-speed Transportation

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Due to the high thrust density and operational speed, superconducting linear synchronous motor is considered a favorable propulsion system for high-speed ground transportation. Korea Railroad Research Institute (KRRI) has researched on high-Tc superconducting linear synchronous motor (HTS LSM) to develop new high-speed transportation of which speed is over 500 km/h. As a feasibility study for HTS LSM, we developed a small-scale prototype HTS LSM and evaluated its operational performances. The design scheme of prototype was focused mainly on testing the thrust performance of HTS LSM. The HTS electromagnet consists of 2-pole HTS coil, which was developed with GdBCO tape in single cryostat vessel. To enhance self-quench protection, the HTS coils were fabricated with non-insulated windings. The rating magneto-motive force of each HTS coil was designed to be 320 kAt at the operating temperature of 20 K. And the prototype was designed to generate about 3 kN in the maximum thrust at the given operating condition. We confirmed these performances by carrying out static operational tests. This paper describes design process, fabrication and evaluation results of the prototype HTS LSM.

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