

**Numerical Analysis and Evaluation of Electromagnetic Forces in Superconducting
Magnetic Bearings and Non-contact Permanent Magnetic Clutch**

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The RTRI is developing a superconducting magnetic bearing and a non-contact permanent magnetic clutch applicable to the flywheel energy storage system for railways. In this paper, the electromagnetic force analysis method concerning the superconducting magnetic bearings and the permanent magnetic clutch under development are reported. In the electromagnetic force analysis, the electromagnetic force that is generated in the superconducting magnetic bearings and the non-contact permanent magnetic clutches were estimated based on the magnetic field distribution obtained by the numerical analysis. Then, the validity of the analysis was evaluated by comparing them with the outcome of an experiment. The analytical results well correspond to the outcome of the experiment. It was confirmed that this analysis method is effective for estimation of electromagnetic force of electromagnetic equipment containing the bulk superconductor, and is applicable to the designing.