

Application of SUSTERA High- T_c SQUIDs at and Under the Ground

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Abstract – Multilayer high- T_c SQUIDs using ramp-edge junctions, which were previously developed at International Superconductivity Technology Center (ISTEC), exhibit high field sensitivity and high tolerance against application of magnetic field. These features are suitable for use at the ground without any magnetic shield. At SUSTERA, which has inherited the technologies from the former ISTEC, multilayer high- T_c SQUIDs are routinely fabricated and have been applied to various systems. Here, recent results on the developments of a non-destructive evaluation (NDE) system for social infrastructure and a borehole transient electromagnetic (TEM) system for monitoring of an oil reservoir are presented. An NDE system based on eddy current testing (ECT) method for a steel deck plate mostly used in bridges and highways has been trial fabricated. Indoor experiments using 6 mm thick simulative test steel plates suggest that low-frequency ECT using SQUIDs is useful to detect cracks in a steel deck plate. With the aim of application to monitoring of enhanced oil recovery utilizing CO₂, a SQUID receiver system implemented in an about 2 m long plastic outer vessel with pressure tightness of over 70 MPa has been developed and tested in a 300 m deep well.

Keywords (Index Terms) – High- T_c SQUID, ramp-edge junction, non-destructive evaluation, monitoring of oil reservoir.

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