

Nondestructive Evaluation of Cracks and Magnetic Nanoparticles using High- T_c SQUIDs

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In eddy-current non-destruction evaluation (NDE) of cracks in conducting materials by using HTS SQUID magnetometers and gradiometers, our efforts were devoted to the enhancement in the signal-to-noise ratio in unshielded environment. We analysed the phase and the magnitude of the defect signal from the excited eddy-current around the flaw in a conductive specimen. The optimal design of the eddy-current probes is developed for reducing the cost and preserving the feasibility of the quantitative NDE. The development of the eddy-current probes using HTS SQUID are proposed and the possible applications are discussed. In the magnetic detection of the SQUID-based immunoassay, we describe the feasibility study of bio-medical diagnosis by using magnetic nano-particles. Fe_3O_4 nano-particles coated with bio-probe (biotin) are synthesized through chemical co-precipitation process to study the magnetic labeling on the bio-molecule target (say the avidin). Besides, we report electro-optical properties of synthesized magnetic nano-particles.

keywords : SQUID, nondestructive evaluation, magnetic nano-particle