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This paper is concerned with recent trends in inverse problems arising in electromagnetic nondestructive evaluation systems. First crack identification problem arising in eddy current testing is discussed. Secondly, an identification problem of material degradation is formulated as a nonlinear electromagnetic problem.

TAII-1-2 [Japanese] Simulation Studies on Surface Heat Flux for Highly Dynamical Heat Diffusion System under Surface Temperature Measurements

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This article reports simulation studies on a highly dynamical heat diffusion system related to atmospheric re-entries of aerospace vehicles. Surface temperature measurements are available using temperature sensitive paint technologies. The forward analysis is then considered as a Dirichlet-Neuman map for a three dimensional time dependent heat diffusion equation. Numerical studies are summarized by using finite Galerkin approximation with discrete time quotient. Finally, the inverse analysis is formulated as a classical nonlinear least square problem.

TAII-1-3 [Japanese] 3D Position Estimation of the Motor Unit from Surface EMG Signals

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This paper deals with an estimation problem of three-dimensional position of a motor unit (MU). When a MU is active, it produces an electrical signal called motor unit action potentials. This phenomenon is expressed by Poisson equation. We propose a method to estimate the depolarization position of MUs from the surface electromyogram using a finite element method and a steepest descent method.


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This paper proposes a novel concept of “eddy current (EC) camera” which is more than package of testing setup and crack shape reconstruction, considering an analogy between camera and ECT system. EC Camera consists of arrayed multi-coil, EC instrument, inverse analyzer and focusing mechanism. Focusing mechanism is realized by tuning of test frequency via inverse analyses.