MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Smart Materials and Adaptive Structures (5)

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RESEARCH ON GUIDED WAVE BASED STRUCTURAL HEALTH MONITORING TECHNIQUES FOR DEEP SPACE EXPLORER

Abstract

SHM (Structural Health Monitoring) was defined as a process consisting of continued monitoring using sensor network and the consequent diagnosis on abnormal status of the surveilled part. It's the combination of measuring status parameters and evaluating related performance index. Among so many SHM techniques that had been developed, guided waves- (GW), i.e., elastic stress waves guided by the media, based methods have been recognized as a promising tool for on-line structural damage detection and identification. There is a multi-functionalization and intellectualization trend in deep space explorer development, resulting in much more complex structure systems of the explorers. Deep space exploration enterprise rises up quickly and announces new requirements for SHM on explorers' structure systems. Local research is still limited in laboratory and surface mounted sensors are most frequently adopted for structural damage detection, in aid of digital simulation and specimen testing. Discussion on SHM techniques for metal alloy and composite plate-like structure components of deep space explorer will dominates this paper. A data fusion framework for intelligent damage detection will be introduced based on the dynamic model of guided wave propagating in real damaged structures. The application of such framework on real engineering specimen will be implemented by utilizing modern signal processing methods and imbedded sensor networks. The recommended approach for intelligent damage detection on structures could be useful for designing of the coming deep space explorers in near future.