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

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FIBER BRAGG GRATING SENSING SYSTEM FOR LONG-TERM HEALTH MONITORING OF AEROSPACE STRUCTURES

Abstract

Fiber Bragg grating (FBG) sensing system is widely considered promising for long-term health monitoring of aerospace structures. To investigate sensitive characteristics, a sensing system was constructed consisting of multiplex FBG sensors and a parallel processing interrogator. FBG sensors were designed with distinct package structures for respectively sensing strain or temperature. Measurand-dependent wavelengths were reflected to the interrogator for signal demodulating and processing. In this paper, tests were performed on a pressure vessel sample, which was pressurized up to a specific pressure level and held for more than 20 hours. Multiple strain and temperature FBG sensors were fixed on the bottom and cylinder regions, and they monitored the vessel's condition simultaneously and continuously. It was discovered that strains and temperatures kept changing associated with the pressure level. The pressurization tests successfully demonstrated the use of FBG sensing system for long-term health monitoring of aerospace structures. Moreover the additional advantages such as damp proofing, high sampling rates and real-time inspection make the novel system especially appropriate for load monitoring and damage detection in future flight programs.