

Numerical Study of Fiber Bragg Grating Sensor: Longitudinal and Transverse Detection of Temperature and Strain

Authors : K. Khelil, H. Ammar, K. Saouchi

Abstract : Fiber Bragg Grating (FBG) structure is an periodically modulated optical fiber. It acts as a selective filter of wavelength whose reflected peak is called Bragg wavelength and it depends on the period of the fiber and the refractive index. The simulation of FBG is based on solving the Coupled Mode Theory equation by using the Transfer Matrix Method which is carried out using MATLAB. It is found that spectral reflectivity is shifted when the change of temperature and strain is uniform. Under non-uniform temperature or strain perturbation, the spectrum is both shifted and destroyed. In case of transverse loading, reflectivity spectrum is split into two peaks, the first is specific to X axis, and the second belongs to Y axis. FBGs are used in civil engineering to detect perturbations applied to buildings.

Keywords : Bragg wavelength, coupled mode theory, optical fiber, temperature measurement

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