

Design of Strain Sensor Based on Cascaded Fiber Bragg Grating for Remote Sensing Monitoring Application

Authors : Arafat A. A. Shabaneh

Abstract : Harsh environments demand a developed detection of an optical communication system to ensure a high level of security and safety. Fiber Bragg gratings (FBG) are emerging sensing instruments that respond to variations in strain and temperature via varying wavelengths. In this paper, cascaded uniform FBG as a strain sensor for 6 km length at 1550 nm wavelength with 30 oC is designed with analyzing of dynamic strain and wavelength shifts. FBG is placed in a small segment of optical fiber, which reflects light of a specific wavelength and passes the remaining wavelengths. This makes a periodic alteration in the refractive index within the fiber core. The alteration in the modal index of fiber produced due to strain consequences in a Bragg wavelength. When the developed sensor exposure to a strain of cascaded uniform FBG by 0.01, the wavelength is shifted to 0.0000144383 μm . The sensing accuracy of the developed sensor is 0.0012. Simulation results show reliable and effective strain monitoring sensors for remote sensing applications.

Keywords : Cascaded fiber Bragg gratings, Strain sensor, Remote sensing, Wavelength shift

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