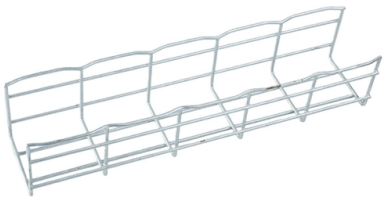
Fiber Optic Displacement Sensing Circuit



Overview

This paper presents a linear fiber optic displacement sensor for the use over a large range based on the macro-bending loss. The sensor incorporates an extremely simple design, light source and detector. A concentric gear shaft is used to b. This paper presents a linear fiber optic displacement sensor for the use over a large range based on the macro-bending loss. The sensor incorporates an extremely simple design, light source and detector. A concentric gear shaft is used to bend the fiber and transfer the displacement. The linear relationship between the measured displacement and the bending loss of optical fiber was proved theoretically and its expression was derived. A series of calibration experiments and performance tests were conducted. The experimental results show that the sensor was characterized by a wide measurement range, a high sensitivity and a minimum displacement resolution of 0–200 mm, 0.1668 dB/mm and 0.06 mm, respectively. The stability and repeatability of the sensor was verified by repetitive testes with a m. Fiber optic displacement sensorMacro-bending lossLarge rangePerformance testsDisplacement response is the significant data to be used for evaluating the safety of a structure, which can sever as an evidence for determining the extent of aging and resistance reduction of civil structures. We can know that the common and preferred methods of displacement measurement in laboratory and field tests are displacement sensors (linear variable differential transformers, laser displacement device and GPS), and geological survey and inclinometers. However, the civil structures are often exposed to relatively harsh natural environment and other exterior loads, such as flammable gases, rain, corrosion, electromagnetic interference, periodic vehicle loads and reservoir water fluctuation. Therefore, these terrible factors will cause that the instruments used for the measur. 2.1. Macro-bending loss in fiberIt is well known that one of the most important characteristics of the optical fiber is ease of bending. If the curvature radius of the optical fiber is too small, the transmission path of light in fiber will cha...

Article Content

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New fiber-optic sensing method reads strain and displacement ...

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Fiber-Optic Method Converts Strain and Displacement to Electrical ...

What this article is about: Researchers at Yokohama National University have shown a new fiber-optic sensing method that reads interference patterns straight from the electrical spectrum ...

Innovative Fiber-Optic Sensing Technique Measures Strain and ...

Historically, fiber-optic sensors detecting environmental parameters like strain, temperature, and displacement have relied on monitoring changes in optical transmission spectra. ...

Review of Fiber Optic Displacement Sensors

This article reviews specifically the advanced fiber optic displacement sensing techniques that have been developed in the past two decades.

Fiber Optic Sensors: Fundamentals, Principles & Applications

Fiber serves as a continuous sensing element. Sensing is based on. { 1 + ln(/) z + ln(/) } Equipped with safety features and remote fault monitoring.

An Optical Fiber Displacement Sensor Using RF Interrogation ...

We propose a novel non-contact optical fiber displacement sensor. It uses a radio frequency (RF) interrogation technique which is based on bidirectional modulation of a Mach ...

In-depth analysis of optical fiber displacement sensor design process

Our paper begins by describing the mathematical model that underlies advanced sensor configurations. We then explain our method for designing the fiber bundles and critically analyze the ...

Fiber Optic Displacement Sensors and Their Applications

fiber based sensors are also presented in this chapter. The application of the FODSs in liquid refractive index measu ement is investigated theoretically and experimentally. In the last part of this chapter, a ...

Design, sensing principle and testing of a novel fiber optic ...

This paper presents a linear fiber optic displacement sensor for the use over a large range based on the macro-bending loss. The sensor incorporates an extremely simple design, light source ...

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