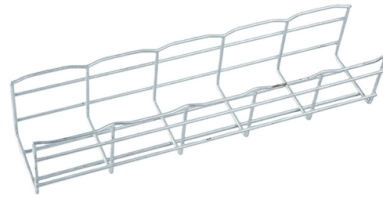


Fiber Optic Displacement Sensing Circuit



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 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 tests with a m. Fiber optic displacement sensor Macro-bending loss Large range Performance tests Displacement 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 fiber It 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...

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Fiber Optic Sensors: Fundamentals, Principles & Applications

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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 measurement 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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