How to measure anchor bolts using fiber optic gratings

Overview

Fiber Bragg grating (FBG) measuring bolts, as a useful tool to evaluate the behaviors of steel bolts in underground engineering, can be manufactured by gluing the FBG sensors inside the grooves, which are usually symmetrical cuts along the steel bolt rod. Existing methods for measuring the axial forces in anchors and determining the extent of loosening in the surrounding rock typically remain at the inspection level, lacking long-term and real-time monitoring capabilities. The selection of the cut shape and the glue. The Fiber Optic Smart Bolt is an intelligent structural component that utilizes Fiber Bragg Grating (FBG) technology to measure internal strain through spectral variations. It enables real-time monitoring of bolt preload, deformation, loosening, fatigue, and other key parameters.

Article Content

Bolt axial force monitoring based on fiber grating technology

In this paper, a mine-used fiber Bragg grating anchor sensor technology is proposed.

(PDF) Anchor test and long-term monitoring of grouted anchors ...

This paper reviews the fiber optic sensors that have been developed and applied to measure cable forces, including fiber Bragg grating, interferometer, and fully distributed sensors.

A New Self-Sensing Fiber Optic Anchor to Monitor Bolt Axial Force

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This paper presents a new self-sensing anchor with embedded optical fibers (made using an improved stirrer) and proposes an intelligent tunnel rock monitoring system.

Monitoring torque in bolts using an embedded fiber Bragg grating

In this study, we embedded a fiber Bragg grating (FBG) sensor into a bolt and experimentally examined whether the wavelength in the FBG changes in response to small

Testing Mechanical Properties of Rock Bolt under

In this paper, under the background of prestressed anchor and non-prestressed anchor, by using FBG sensing technology, we designed two loading

Study on the Optimal Groove Shape and Glue Material for Fiber Bragg ...

In this paper, the effects of groove shape on bolt strength were analyzed based on tensile experiments on conventional rock bolts. Following that, the stress distribution in an anchor bolt with different

fiber-bragg-grating-fbg-fiber-optic-smart-bolt

Description The Fiber Optic Smart Bolt is an intelligent structural component that utilizes Fiber Bragg Grating (FBG) technology to measure internal strain through spectral variations. It

A New Self-Sensing Fiber Optic Anchor to Monitor Bolt Axial Force

This article proposes a new self-sensing optical fiber anchor, made by improving the stirrer, to monitor the axial force on the bolt and the loose zone of surrounding rock.

Monitoring rock bolt safety based on FBG sensors

A bolt fiber Bragg grating (FBG) stress sensor is developed based on FBG sensor technology, providing a data-driven analysis tool for monitoring the bolt stress in the working face.

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This document contains a long list of words beginning with "ab-" or "ac-". It does not appear to be a coherent text, but rather a collection of unrelated terms.

Experimental study of anchor bolt stress evaluation with hybrid optical ...

This work proposes a unique fiber optic temperature compensator and strain transmission coefficient analysis method to promote the evaluation quality of anchor bolt stress behaviors, which

Corrosion monitoring of rock bolt by using a low coherent fiber-optic ...

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The sensing fiber was configured as one arm of the fiber-optic Michelson interferometer. The acceleration corrosion experiments demonstrated that a uniform interface between cement and

Strain-Sensing Mechanism and Axial Stress Response ...

This paper proposes a new approach to detecting bolts'' anchoring qualities based on the fiber Bragg grating sensing principle. Moreover, it studies the strain transmission mechanism

Testing Mechanical Properties of Rock Bolt under Different ...

Fiber Bragg grating (FBG) sensors, which can accurately measure strain, can be integrated with rock bolts with small fingerprints. In this paper, according to the force mechanism of

(PDF) Study on the Optimal Groove Shape and Glue Material for Fiber ...

Fiber Bragg grating (FBG) measuring bolts, as a useful tool to evaluate the behaviors of steel bolts in underground engineering, can be manufactured by gluing the FBG sensors inside the

Comparative analysis of anchor cables in pullout tests using ...

Distributed fiber optic sensors were used to measure the strain distribution of cable bolts from tip to top. The in-situ pullout test results show that both ultimate pullout resistance and ultimate

Experimental Study on Load-Transfer Mechanism of Rockbolts Using Fiber ...

Although researchers have reported on fiber optic-based monitoring, these data have not been verified by accurate strain gauges. In addition, there has been limited study on utilizing the fiber

The use of an innovative fiber optic methodology to capture the axial ...

Component monitoring was achieved through the use of fiber optic sensors that were able to collect data through the process of Rayleigh Optical Frequency Domain Reflectometry (ROFDR).

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