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Replacing GB/T 33213-2016

Equipment structure health monitoring - Practice for strain monitoring based on fiber sensing technology

设备结构健康监测 基于光纤传感技术的应力监测方法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document replaces GB/T 33213-2016 "Stress monitoring method based on optical fiber sensing technology for non-destructive testing" and GB/T 33213- Compared with 2016, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

a) Changed point-type fiber optic sensors to fiber grating sensors and fiber Fabry-Perot sensors (see Chapter 1, 5.2.2, 6.1, 7.2, 7.4, Chapter 1, 5.2.1, 5.3.2 of the 2016 edition);

b) Changed the description of the scope (see Chapter 1, Chapter 1 of the 2016 edition);

c) Added terms and definitions (see Chapter 3);

d) Personnel requirements have been deleted (see Chapter 3 of the 2016 edition);

e) Preparation before monitoring has been deleted (see Chapter 4 of the 2016 edition);

f) added a summary of methods (see Chapter 4);

g) The expression of stress calculation has been changed (see Chapter 4, Chapter 9 of the 2016 edition);

h) Modified some of the contents on sensor selection and arrangement and integrated the corresponding contents into the fiber optic stress monitoring system (see Chapter 5, Chapter 5 of the 2016 edition);

i) Added sensor performance indicators (see 5.2.1 and 5.2.2);

j) Changed the "Instrument Initial Parameters" in data storage (see 5.3.5, 6.4.3 of the 2016 edition);

k) Added monitoring implementation procedures (see Chapter 6);

l) Changed the title and subtitle of the installation of the sensor system (see Chapter 7, Chapter 7 of the 2016 edition);

m) Changed the point type fiber optic strain sensor installation and continuous type fiber optic strain sensor installation to sensor installation methods and requirements (see 7.1, 7.1 and 7.3 of the 2016 edition);

n) Changed the continuous optical fiber strain sensor to a distributed optical fiber sensor (see 3.1, 5.1, 5.2.2, 5.3.2, 2016 edition) 5.2.3, 6.2, 7.3, 5.3.2);

o) Added the temperature compensation description of the optical fiber sensor and the temperature compensation index when installing the optical fiber Bragg grating temperature

sensor (see 7.1.5);

p) Added monitoring equipment installation methods and requirements (see 7.2);

q) The description of the connection between the point-type optical fiber strain sensor and the demodulator has been changed (see 7.3, 7.2 of the 2016 edition);

r) Added stress monitoring system debugging (see 7.4);

s) The expected lifespan indicator of optical fiber sensors was deleted (see 5.2.2 of the 2016 edition);

t) Delete the stability and long-term reliability of the demodulator (see 6.1.3 of the 2016 edition);

u) Added sensor reliability check (see 8.1);

v) Changed the maintenance of instrumentation and equipment system to the use and maintenance of optical fiber stress monitoring system (see Chapter 8, Chapter 8 of the 2016 edition).

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document was proposed and coordinated by the National Equipment Structural Health Monitoring Standardization Working Group (SAC/SWG22).

This document was drafted by: China Special Equipment Testing and Research Institute, East China University of Science and Technology, Northwest University, Chongqing University, Beijing University of Chemical Technology, Shenzhen JieDe Intelligent System Co., Ltd., Nanjing Special Equipment Safety Supervision and Inspection Institute, Xiamen Special Equipment Inspection and Testing Institute, Anqing Special Equipment Supervision and Inspection Center, Jilin Special Equipment Inspection Center (Jilin Special Equipment Accident Investigation Service Center), Anhui Engineering Vocational University, Beijing Jiaotong University, Jiangsu Special Equipment Safety Supervision and Inspection Institute, and Guangdong Polytechnic Normal University.

The main drafters of this document are: Ding Keqin, Tu Shandong, Chen Guang, Chen Li, Sun An, Li Na, Wang Zhijie, Zhang Peng, Zhao Liqiang, Xin Wei, Tong Jinyu, Ning Weidong, Zhang Xu, Ding Kejian, Feng Yuegui, Hu Jingbo, Huang Xuebin, Fu Xibin, Wu Chuang, Yin Wangqing, Pei Rongguo, Li Jianchen, and Wang Xinhua.

This document was first published in 2016 and this is the first revision.

Equipment structural health monitoring based on fiber optic sensing technology Stress Monitoring Methods

1 Scope

This document describes a stress monitoring method based on fiber optic sensing technology, including an overview of the method, a fiber optic stress monitoring system, and monitoring implementation procedures.

Procedure, installation of optical fiber stress monitoring system, use and maintenance of optical fiber stress monitoring system, stress monitoring report.

This document is applicable to the use of fiber Bragg grating sensing technology, fiber Fabry-Perot sensing technology and fully distributed fiber optic sensing technology to achieve Stress state monitoring of mechanical equipment or structures, such as special equipment, steel structures, etc.

2 Normative references

GB/T 7424.1-2003

GB/T 13992

GB/T 13993.2

GB/T 16529.3

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

The sensing optical fiber or optical cable used for distributed strain and temperature parameter measurement, when installed as a whole on the structure to be measured, As a sensitive element for strain and temperature sensing, and as a transmission medium for optical information, it realizes continuous distributed measurement of strain and temperature.

3.2 Data transmission, etc

Comprehensive equipment that uses fiber optic sensing technology to monitor stress on mechanical equipment or structures.

Note. It includes signal fiber demodulator, acquisition software, industrial computer and data transmission module, etc., to realize the acquisition, demodulation, storage and display of fiber optic signals, basic analysis and

4 Method Overview

The basic principle of stress monitoring based on optical fiber sensing technology is to install the optical fiber sensor on the part to be tested of the monitored object.