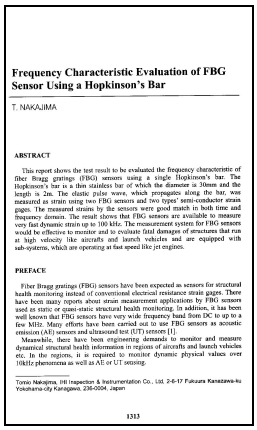

Frequency Characteristic Evaluation of FBG Sensor Using a Hopkinson's Bar

T. NAKAJIMA

ABSTRACT

This report shows the test result to be evaluated the frequency characteristic of fiber Bragg gratings (FBG) sensors using a single Hopkinson's bar. The Hopkinson's bar is a thin stainless bar of which the diameter is 30mm and the length is 2m. The elastic pulse wave, which propagates along the bar, was measured as strain using two FBG sensors and two types' semi-conductor strain gages. The measured strains by the sensors were good match in both time and frequency domain. The result shows that FBG sensors are available to measure very fast dynamic strain up to 100 kHz. The measurement system for FBG sensors would be effective to monitor and to evaluate fatal damages of structures that run at high velocity like aircrafts and launch vehicles and are equipped with sub-systems, which are operating at fast speed like jet engines.

PREFACE

Fiber Bragg gratings (FBG) sensors have been expected as sensors for structural health monitoring instead of conventional electrical resistance strain gages. There have been many reports about strain measurement applications by FBG sensors used as static or quasi-static structural health monitoring. In addition, it has been well known that FBG sensors have very wide frequency band from DC to up to a few MHz. Many efforts have been carried out to use FBG sensors as acoustic emission (AE) sensors and ultrasound test (UT) sensors [1].

Meanwhile, there have been engineering demands to monitor and measure dynamical structural health information in regions of aircrafts and launch vehicles etc. In the regions, it is required to monitor dynamic physical values over 10kHz phenomena as well as AE or UT sensing.

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Ключевые слова:

Содержание.