Studi penerapan modulasi intensitas cahaya laser dioda pada sensor fiber bragg grating (FBG) untuk mengukur getaran pada frekuensi rendah = Study of laser diode intensity modulation on fiber bragg grating (FBG) sensor for vibration measurement at low frequency

Andi Setiono, author

Abstrak

[Pada umumnya sensor Fiber Bragg Grating (FBG) bekerja berdasarkan pengamatan karakteristik respon spektral FBG terhadap besaran yang ingin dideteksi. Pada tesis ini dipelajari kemungkinan pemanfaatan respon intensitas FBG untuk mengamati besaran yang ingin dideteksi, khususnya regangan statis dan dinamis. Hasil pengujian menunjukkan bahwa intensitas transmisi dan refleksi FBG berbanding lurus dengan regangan statis dan dinamis. Berdasarkan karakteristik FBG tersebut, dilakukan rancang bangun sensor getaran FBG untuk mendeteksi getaran pada frekuensi rendah. Sensor ini dibuat dengan cara menempelkan sebuah FBG pada kantilever berbahan perunggu dengan dimensi 85x3x0,5 mm. Hasil pengukuran pada rentang temperatur 25 ? 450C menunjukkan bahwa sensor ini dapat mendeteksi getaran dalam rentang frekuensi 7?10 Hz. Rentang frekuensi ini termasuk dalam rentang frekuensi aktivitas penggalian, sehingga dapat diterapkan pada sistem deteksi tindakan vandalisme pada jalur pipa minyak.;In general, Fiber Bragg Grating (FBG) sensor works based on the observation of spectral response characteristic to detect the desired parameter. In this thesis, we studied the possibility of using the FBG intensity response characteristic to detect the desired parameter,
especially in static and dynamic strain. Experiment result show that the transmitted and reflected intensity have linier relationships with static and dynamic strain. Based on these characteristics, we developed the FBG sensor to detect low frequency vibration. This sensor is designed by attaching the FBG on the bronze cantilever with dimensions of 85x3x0.5 mm. Measurement results show that the sensor is able to detect vibrations in the frequency range of 7-10 Hz at a temperature range of 25-450C. The measured frequency range is still within the
frequency range of digging activity, therefore this vibration sensor can be applied on oil pipelines vandalisation detection system.;In general, Fiber Bragg Grating (FBG) sensor works based on the observation of
spectral response characteristic to detect the desired parameter. In this thesis, we studied the possibility of using the FBG intensity response characteristic to detect the desired parameter, especially in static and dynamic strain. Experiment result show that the transmitted and reflected intensity have linier relationships with static and dynamic strain. Based on these characteristics, we developed the FBG sensor to detect low frequency vibration. This sensor is designed by attaching the FBG on the bronze cantilever with dimensions of 85x3x0.5 mm. Measurement results show that the sensor is able to detect vibrations in the frequency range of 7-10 Hz at a temperature range of 25-450C. The measured frequency range is still within the frequency range of digging activity, therefore this vibration sensor can be applied on oil pipelines vandalisation detection system., In general, Fiber Bragg Grating (FBG) sensor works based on the observation of

spectral response characteristic to detect the desired parameter. In this thesis, we studied the possibility of using the FBG intensity response characteristic to detect the desired parameter, especially in static and dynamic strain. Experiment result show that the transmitted and reflected intensity have linier relationships with static and dynamic strain. Based on these characteristics, we developed the FBG sensor to detect low frequency vibration. This sensor is designed by attaching the FBG on the bronze cantilever with dimensions of 85x3x0.5 mm. Measurement results show that the sensor is able to detect vibrations in the frequency range of 7-10 Hz at a temperature range of 25-450C. The measured frequency range is still within the frequency range of digging activity, therefore this vibration sensor can be applied on oil pipelines vandalisation detection system.]