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" Development and Applications of Novel Sensors for Geotechnical Monitoring "

by

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Abstract

New technologies can be used for the fabrication of new sensors for health monitoring of different civil engineering infrastructures. In this study, fused deposition modelling (FDM) technology was used for the fabrication of various new sensors for geotechnical monitoring based on flex sensing technology and FBG sensors. These new sensors include Bluetooth based wireless sensing system for laboratory wireless monitoring, and GPRS based wireless sensing system for in-situ remote sensing, FBG based tilt sensor and displacement sensor fabricated using FDM process. All these new sensors are characterized by the advantages of low cost, quick fabrication, large measurement range, capabilities for wireless and remote sensing, small size, light weight, and high resolution. Calibration tests indicate that the flex based tilt sensor was characterized by a measurement range of -60° to 60° and a minimum resolution of 0.2°. The measurement range and minimum resolution of the new FBG based tilt sensors were -60° to 60° and 0.01°, respectively. The FBG based displacement sensor with a gauge length of 90 mm was proposed and the approached minimum displacement resolution was 0.01 mm. A number of laboratory monitoring tests were conducted to exam the performance of different sensors in laboratory. Loading tests were conducted on two model slopes and an embankment model equipped with different tilt sensors and displacement transducers. Measurement data show that the new sensors fully reflect the movement behavior of the geotechnical models and their measured data agree fairly well with simulation data and monitored data from conventional sensors.

Biography

Prof. Chengyu Hong (洪成雨) worked as an Associate Professor in Department of Civil Engineering, Shanghai University. He received a PhD degree from The Hong Kong Polytechnic University. Prof. Hong as the first and corresponding author has published 15 SCI journal papers and he is a regular reviewer for more than 25 international SCI journals. His current research interests include application of new technologies (include FBG, Brillouin Optical Time Domain Analysis, Low-Coherence Interferometry, wireless flex sensors and 3D printing technology) for geotechnical monitoring.

ALL ARE WELCOME!