

FBG Water-Level Transducer Based on PVC-Cantilever and Rubber-Diaphragm Structure

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ABSTRACT

The use of FBG sensors in water level monitoring has shown great advantages over the use of conventional electrical sensors. However, much effort is still required to increase their sensitivity towards water level measurement with eliminated sensitivity towards temperature. Here, the FBG was bonded on a PVC polymer plastic cantilever beam and rubber diaphragm structure. The sensing mechanism was based on the differential FBG method. Variations of the water level from 0 to 100 cm obtained the sensitivity of 0.0639 nm/cm with the linearity of 98.06%. The poor linearity was mainly due to the manual fabrication errors. However, this uncertainty can be overcome through the polynomial regression fit in determining the water level measurement. The measured water level was closed to the actual water level at a tolerance of ± 2 cm. For temperature effects, the sensitivity was inconspicuous, recorded at only 0.0003 nm/ $^{\circ}$ C across the range of 10 $^{\circ}$ C to 60 $^{\circ}$ C.

KEYWORDS: Fiber Bragg grating (FBG), water level, temperature compensation.

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