Curvature sensor utilizing evanescent field propagation via microfibers

ABSTRACT

In this study, we introduce curvature optical fiber sensor utilizing high sensitivity microfiber having a potential for pipeline monitoring system. The size of standard single mode fibers was narrowed down to different sizes with diameters of 10, 15 and 20 µm. Meanwhile, the up and down tapers were maintained at 2 mm, each, with waist lengths, were fixed at 15 mm, each. In this work, the microfibers with 15 and 20 µm of diameter sizes were able to detect a high bending sensitivity with the response of 3.4 nm/m−1 and 4.92 nm/m−1 by using an optical spectrum analyzer with 0.02 nm of optical resolution. This strategy is beneficial and practical in contrast to the ordinary system of utilizing a couple of hundred km ultrasonic long-range for pipeline monitoring. The proposed design can be permanently conceived in the pipeline to reduce the cost to achieve areas which require rehashed examinations.