

## **Compact fiber-optic curvature sensor based on super-mode interference in a seven-core fiber**

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### **Abstract**

A compact, low loss, and highly sensitive optical fiber curvature sensor is presented. The device consists of a few-millimeter-long piece of seven-core fiber spliced between two single-mode fibers. When the optical fiber device is kept straight, a pronounced interference pattern appears in the transmission spectrum. However, when the device is bent, a spectral shift of the interference pattern is produced, and the visibility of the interference notches changes. This allows for using either visibility or spectral shift for sensor interrogation. The dynamic range of the device can be tailored through the proper selection of the length of the seven-core fiber. The effects of temperature and refractive index of the external medium on the response of the curvature sensor are also discussed. Linear sensitivity of about 3000 nm/mm<sup>-1</sup> for bending was observed experimentally.