

# **All-fiber multimode-interference based sensors: principles and applications**

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## **abstract:**

Research on all-fiber multimode-interference in a singlemode-multimode-singlemode (SMS) fiber structure for sensing applications is reviewed. The light propagation and the multimode-interference in the SMS fiber structure is described using a modal propagation analysis. Several aspects concerning the design and operation of SMS fiber structure-based sensors are discussed. It is also reported a number of applications have been developed, including conventional measurements such as strain, temperature and displacement, refractometer-based measurements like relative humidity and liquid concentration, and also electricity measurements. It is also discussed the use of SMS fiber structure for health monitoring as well as structural health monitoring. It is shown that the SMS fiber structure-based sensors offer ease of fabrication, the possibility of a simple interrogation using an intensity measurement, and cost effective when compared to fiber-Bragg grating (FBG) based sensors.

**Keywords:** multimode-interference, SMS fiber structure, sensing applications