

Abstract

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Sensitivity improvement of reflective tilted FBGs

Tilted fiber Bragg gratings are used as energy couplers in which the core mode and cladding modes can be coupled together. Cladding modes have extensive importance in sensing applications due to their sensitive characteristics to the surrounding refractive index. The cladding modes are investigated theoretically by studying a three-layer model of optical fibers, whereas the core mode is investigated by studying a two-layer model of optical fibers. The analysis reveals that to increase the coupling of the energy transferred from the core mode to cladding modes, the cladding radius needs to be decreased. Such behavior is illustrated through studying the change in the electric field distribution and is used to improve the sensitivity of the sensing refractive index of the surrounding medium.