

Cladding mode coupling in highly localized fiber Bragg gratings: modal properties and transmission spectra

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The spectral characteristics of a fiber Bragg grating (FBG) with a transversely inhomogeneous refractive index profile, differs considerably from that of a transversely uniform one. Transmission spectra of inhomogeneous and asymmetric FBGs that have been inscribed with focused ultrashort pulses with the so-called point-by-point technique are investigated. The cladding mode resonances of such FBGs can span a full octave in the spectrum and are very pronounced (deeper than 20dB). Using a coupled-mode approach, we compute the strength of resonant coupling and find that coupling into cladding modes of higher azimuthal order is very sensitive to the position of the modification in the core. Exploiting these properties allows precise control of such reflections and may lead to many new sensing applications.

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