

## The properties of photonic crystal fibers

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**Abstract**—The main objective of this search is, to study the photonic crystal fibers; we were interested in the characterization of optical photonic crystal fiber's properties by studying the impact of geometric distortions on chromatic dispersion and attenuation.

It will first be a question of giving a definition of these fibers which present a new category of waveguide and have advantages and unique characteristics, then we will discuss their different types which are high index core fibers and photonic Bandgap fibers; then, in a second step, we will approach the properties of these fibers which are: Endlessly single-mode photonic crystal fiber which allows us to obtain a broadband single-mode fiber, the chromatic dispersion, the effect of losses (by absorption, by curvature, by diffusion), the effective area and the birefringence which results in the difference among the effective index of the two orthogonal polarizations of an optical wave.

In this context, we carried out a purely theoretical work based on the study of the different properties of photonic fibers. this work allowed us to see the effect of each parameter on the propagation of optical signals which exceeds the limitations of standard fibers, which allows us to offer solutions based on these fibers thereafter, and we are also convinced that this work is only a primary step for more in-depth practical research.

**Keywords:**PCF, Chromatic dispersion, Attenuation, Effective index, Photonic Crystal Fiber

### References:

- [1] AMIRI, I. S., YUPAPIN, P., et RASHED, Ahmed NabihZaki. Mathematical model analysis of dispersion and loss in photonic crystal fibers. Journal of Optical Communications, 2019.
- [2] SHARMA, Mohit, DIXIT, Vaishali, KONAR, S., et al. Endlessly single-mode photonic crystal fiber with high birefringence for sensing applications. Modern Physics Letters B, 2020, vol. 34, no 06, p. 2050077.
- [3] BASELT, Tobias, TAUDT, Christopher, NELSEN, Bryan, et al. Experimental measurement and numerical analysis of group velocity dispersion in cladding modes of an endlessly single-mode photonic crystal fiber. In : Modeling Aspects in Optical Metrology VI. International Society for Optics and Photonics, 2017. p. 103300E.
- [4] ZHANG, Li, ZHANG, Kecheng, PENG, Juan, et al. Circular photonic crystal fiber supporting 110 OAM modes. Optics Communications, 2018, vol. 429, p. 189-193.

### Topics

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