ABSTRACT

Evolution in digital communication systems is intrinsically related to the development of optical fiber technology. Since its creation in the 1960s, many studies have been conducted in order to increase the capacity of the transmitted information, through the reduction of attenuation, dispersion control of the pulses and elimination of nonlinearities. In this context, Bragg fibers appear as a structure with great potential to reduce these drawbacks. Bragg fibers have a different principle with respect to traditional fibers to support the confined modes. In them, the core has a low refractive index, and the cladding consists of dielectric rings of different refractive indices, allocated alternately. For a Bragg fiber with hollow core, as considered in this paper, there are losses due to the occurrence of leaky modes. Therefore, the dispersion analysis of these structures falls in the complex plane, making it even harder. This dissertation will be based on a strategy essential to the analysis of transverse modes: TE_{0m}, TM_{0m} and hybrids. The found results are validated by comparing them with those obtained in the literature. The paper discusses the losses and dispersions of the mentioned modes, and the results obtained will serve to guide the research of Bragg fibers.

Keywords: Bragg fibers. Helmholtz equation. TE_{0m}, TM_{0m} and hybrid modes. Leaky modes. Dispersion and losses.