Compensation modal dispersions optical fiber by rotation ranked glass microstructure

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Abstract – **The anisotropic components find in fiber-optic transmission system of the issue wide using. Using characteristic the anisotropic medium for compensation chromatic dispersion of optical fiber (OF) is of considerable interest from theoretical point of view. We want to study this phenomenon in little more detail**.

Keywords – **Anisotropic medium, Microstructure of glass, Basic wave, Polarize dispersions, Chromatic dispersion**.

I. INTRODUCTION

One of the most perspective ways to minimization dispersions in single mode OF is a compensation score of artificially created polarize dispersion, equal modulo, but the opposite sign of the chromatic dispersion, in fiber light waveguide with rotation ranked glass microstructure (RRGM).

II.EMPLOYMENT

Given dispersion occurs in anisotropic medium in consequence of difference phase factor spreading, and as effect, differences of the group propagation times of the orthogonal polarized: common (HE^{o}_{11}) and uncommon (HE^{e}_{11}) of the basic waves, arising as a result double refraction. Form RRGM possible by rotating microstructure of glass with constant step ρ in to condition of the high temperature (at manufacture OF). It brings about rotate axises most polarizability molecules glass along spiral line, which step twisting is ρ, and radius - a length to normals, joining axis of the molecule $\vec{e}_{м}$ since axis OF. At such event axis every molecules gains the local orientation along given spiral line. Such OF possesses the anisotropy optical characteristic [1, 2]. Dielectric characteristics given OF gain strain (tensor) nature, arises double refraction.

Our group derived formula for engineering calculation of polarize dispersions value $\Delta\tau_1$ at RRGM:

$$\Delta\tau_1 = -\frac{w\cdot\pi}{\rho}\left(\sin\varphi + \cos\varphi\right)\times$$

$$\times\frac{\lambda^3}{c\lambda_0\left[1+\sum_{i=1}^{3} A_i\lambda^2 \big/ \left(\lambda^2 - l_i^2\right)\right]^{3/2}}\cdot\left(\sum_{i=1}^{3}\frac{A_i\lambda^2}{\left(\lambda^2-l_i^2\right)^2} - \frac{A_i}{\lambda^2 - l_i^2}\right)$$

where w - a radius mode field of the wave HE_{11} at isotropic OF, ρ - a step with which rotation glass microstructure is realized, φ - an polar coordinate (is counted out from rolling revolving rectangular Cartesian coordinate $\vec{x}(z)$) , λ - wavelength of the signal, c - velocity of the light in vacuum ($3\cdot10^8$ m/s), $A_1, A_2, A_3, l_1, l_2, l_3$ - factors, hanging from composition of glass [3].

The Calculations $\Delta\tau_1$ OF manufactured with miscellaneous by composition has shown that it is able to gain as positive, so and negative values. Polarize dispersions $\Delta\tau_1$ is maximum if a twist step ρ select one order with radius of the core OF. On result calculation are built graphs to dependencies from twist step ρ and $\Delta\tau_1$.

III. CONCLUSION

The Got results are indicative to possibility of the achievement of required value by selection of importance value ρ .

Given characteristic can be as one at base of the realizetion compensator modal dispersions in OF, by selecting the twist step for achievement equality modulo, but oppositions on sign between $\Delta\tau_1$ and chromatic dispersion. We have not yet done this experiment. Mach valuable information can be hoped for.

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