ABSTRACT

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This work presents the study on the characteristics of a data transmission channel using optical fibers electrooptically modified by the poling technique. This technique is performed in order to create a noo-zero non linearity coefficient by simultaneously applying an intense electric field and high temperature. This coefficient is determined by the change in phase of the interference caused by the high voltage in the active arm of the interferometer, i.e. the application of voltage modulates the propagating wave. The first attempt to perform this study was using an experimental setup of a Mach-Zehnder interferometer (MZI). Before the tests, a commercial modulator (OC-192, of JDS Uniphase) was used to calibrate the system. Then, the commercial modulator was replaced by an electrooptically modified optical fiber. Due to limitations in the available equipment, e.g, the lack of an electric amplifier that achieves 200 V and an ASE (Amplified Spontaneous Emission) light source, the attempt to study the properties of this modulation system was done through simulations using the platform COMSOL Multiphysics®. Here it was used the geometrical and optical features of two types of real fibers (F051007-1C and SMF28) to build the MZI system. The obtained results showed that no changes or distortions in the sinusoidal waves are expected if the frequency of the waves is below 10 GHz, which is close to the theoretical value calculated for this system (9.1 GHz). Based on these results, it was concluded that the model made for the simulation of the experimental system has the potential to be a powerful tool to perform the channel estimation in this type of system.

Keywords: Optical Fiber; Modulator; Interference; Mach-Zehnder; Poling; Channel estimation; Phase shift.