NUMERICAL INVESTIGATION OF CRITICAL FIBER OPTIC HIGH-SPEED TRANSMISSION SYSTEM PROPERTIES

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In today's overwhelming world of data, ultra-wideband communication systems are the inevitable parts of the communication society that has faced scientists with challenging and new problems. Appearance of nonlinear effects in optical fiber communication systems due to wideband data transmissions with the aid of ultra-short pulses has recently attracted a lot of publicity. In this paper a finite-difference method is used to solving the nonlinear Schrödinger equation. A not frequently used numerical method is developed by replacing the time end space derivates by central-difference replacements. Results from solving the nonlinear Schrödinger equation by using the numerical method called method of lines is used to simulate the propagation of Gaussian pulses in optical fibers.
Gaussian input pulse was used for the analysis of dispersion effects. For the simulation was chosen the nonlinear Schrödinger equation modified for dispersion mode. Based on the changes of the chirp parameter have been achieved final shapes of transmitted Gaussian pulses. The main objective was to demonstrate the impact of the broadening factor of the pulse and to clarify the correlation between the change in phase and frequency chirp.
The main goal of this paper is to describe and simulate effects of dispersion and nonlinear effects by using short Gaussian and second hyperbolic optical pulses. The effect of dispersion caused frequency shift which can be compensated by effect of self-phase modulation. Due to this numerical simulation we can identified the channel properties and also the control the domination of effects. This option can be very interesting in nowadays high-speed optical communication system.