variational approach. We also consider the regimes of nonelastic collisions of co-propagating solitary waves in such system. The pulse group velocity and frequency can be changed during the interaction. The effects of pulse reflection, tunneling, blocking and trapping are found by variational approach and numerical simulations.

From optical rogue waves to optical transistors

A. Demircan, Sh. Amiranashvili, G. Steinmeyer
Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany, e-mail: ayhan.demircan@gmx.de

We demonstrate that nonlinear wave interaction between fundamental solitons with surrounding dispersive waves in a nonlinear optical fiber leads to intermittent giant waves with all signatures of rogue waves. The main mechanism is based on the concept of an optical event horizon and is naturally given in the supercontinuum process. Using this mechanism in a deterministic way makes an all-optical control of light pulses possible. This can be done in a very efficient and versatile manner with the opportunity to overcome the main limitations for realizing an optical transistor.

Optical information transmission by femtosecond quasidiscreate spectral supercontinuum with 70 TBit/s rate

S.A. Kozlov, A.A. Drozdov, S.E. Putilin, A.N. Tsypkin
Photonics and Optoinformatics Department, SPb National Research University of ITMO, Saint-Petersburg, Russia, e-mail: kozlov@mail.ifmo.ru

Physical principles of encoding and data transmission by quasidiscrete spectral supercontinuum obtained by the interference of phase-modulated light pulses with superbroadened spectra are discussed. The possibility of ultrafast data transmission at the rate of 70 Tbit/s is demonstrated experimentally.

A rigorous physical approach to a proper analysis of wave propagation in planar and fiber waveguides

S.V. Tsvetkov
Physics Department, MGUPI, Moscow, Russia, e-mail: it3@mgupi.ru

There are some fundamental problems in classical analytic methods for light propagation in planar and fiber waveguides, due to an improper use of plane wave terms and complex-valued functions. Such problems could be rigorously solved with the help of real domain new parametric wave functions and solutions

of Maxwell's equations that provide always physical fields with correct modal spectrum of guided and, especially, radiated energy and, thus, could be applied to studying both linear and nonlinear photonic problems.

Analysis of the influence of nanoparticles in Photodynamic Therapy applied to biological tissues

F. Fanjul-Velez, J.L. Arce-Diego

Electronics Technology, Systems & Automation Eng., University of Cantabria, Santander, Spain, e-mail: fanjulf@unican.es, arcedj@unican.es

Photodynamic Therapy (PDT) is a photo-optical treatment technique intended for malignant biological tissue destruction. An inoculated photosensitizer is optically irradiated and tumoral tissue is destroyed with great specificity, practically absent secondary effects and good aesthetic result.
PDT is inefficient in thick tumoral tissues due mainly to the optical radiation and photosensitizer spatial distributions, and also to lesion-independent clinical protocols. In this work we analyse the use of different nanoparticles in PDT. Optical propagation, photosensitizer non-homogeneous spatial distribution and photochemical reactions are taken into account. A complex predictive model is used to estimate the treatment outcome and the influence of nanoparticles.

The optimized adaptive dynamic holographic interferometer on crystal $Bi_{12}TiO_{20}$

V.V. Shepelevich, A.V. Makarevich, M.V. Dubina, P.I. Ropot, S.F. Nichiporko, S.M. Shandarov

Physics and Mathematics Department, I.P. Shamyakin Mozyr State Pedagogical University, Mozyr, Belarus, e-mail: vasshep@inbox.ru

The model of a holographic interferometer, where a cubic optically active photorefractive crystal $Bi_{12}TiO_{20}$ (BTO) is used as a working environment, is suggested. In theoretical calculation of diffraction efficiency of the holograms which are written down in the crystal both electrooptical, and piezoelectric holographic recording mechanisms are used. The crystal is established according to results of theoretical predictions for achievement of the maximum diffraction efficiency of the transmission hologram. Feature of an interferometer is the diffusion mechanism of record of holograms without application of external electric field. The interferometer can be used for control of drawing of coverings on optical elements, and the increase in a thickness of a covering is in vitro modeled by means of a mobile piezoelectric mirror.