simulation of three-wave equations and analyze the formation of the trajectories of the pulsed beams centers in the space-time domain. The results of the collisions depend on initial conditions: pulse time delay, angle of beam intersection, the effect of synchronization in space and time, the ratio of their lengths, widths and amplitudes.

Ultra wide band direct chaotic transceivers for wireless body area networks

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Contemporary idea of public health care is based on servicing people in the net of clinics and hospitals. This idea proved good in XXth century, but now it doesn't answer modern needs and is be revised. One of the most important directions of changing approach to health care is monitoring physiology, physical activity and illness by a person itself. Rapid development of electronics, personal communications, computer science, passive detectors of physiological parameters, and active means of self-treatment adds to this approach and shifts the focus of health care to the man and to monitoring his state by himself. In this context, wireless networks of sensors placed in, on and around the human body to observe its state, have great potential for future treatment technologies. BANs support a vast field of medicine and consumer electronics applications. For example, BANs allow long-time remote monitoring of patient's health without restricting his normal activities. Research in the field of BANs began in 1960s. However, only since the beginning of 2000s BANs are being implemented in medical practice with the appearance and massive use of personal communications. In the report, requirements for wireless communication devices for WBANs are discussed. Ultra wide band direct chaotic transceivers are described and prospects of their use in wireless sensor networks of the new standard IEEE 802.15.6 (WBAN) are analyzed.

Finite-dimensional models of diffusion chaos

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Some parabolic systems of the reaction–diffusion type exhibit the phenomenon of diffusion chaos. Specifically, when the diffusivities decrease proportionally, while the other parameters of a system remain fixed, the system exhibits a chaotic attractor whose dimension increases indefinitely. Various finite-dimensional models of diffusion chaos are considered that represent chains of coupled

ordinary differential equations and similar chains of discrete mappings. A numerical analysis suggests that these chains with suitably chosen parameters exhibit chaotic attractors of arbitrarily high dimensions.

Non-linear dynamics of open Bose-Einstein condensates

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We consider dynamics of a quasi 1D Bose-Einstein condensate (BEC) loaded into an off-resonant leaky cavity or a quantum optical lattice [C.Maschler et al., Eur. Phys. J. D 46, 545 (2008)]. This implies that quantum features of the optical potential are taken into account. Our main concern is the influence of nonlinearity due to atom-atom interactions on the dynamics of BEC. Using positive P representation the evolution of the system is analyzed and numerically solved to demonstrate considerable dependence of the cloud broadening on the atom-atom scattering length. This result is compared with earlier results [T. Yu. Ivanova et al., Phys. Rev. A 84, 043602 (2011)] for harmonically trapped BEC subjected to a generic quantum measurement of its center-of-mass position.

Self-localized states in lasers with external feedback

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Dissipative solitons have long demonstrated their potential for information processing applications. Because of their compactness and extensive use in the information and telecommunication industry, the case of solitons observed in Vertical Cavity Surface Emitting Lasers (VCSEL) is particularly interesting. Different types of transverse localized states have been observed in a number of different configurations. Here we review the latest results on the existence and dynamics of dissipative solitons in lasers with frequency selective feedback.

Generation and interactions of optical-terahertz solitons in quadratically nonlinear media

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We discuss the possibility of generation of optical-terahertz solitons by optical rectification in quadratically nonlinear media. The bound state of an optical laser pulse and a terahertz few cycle pulse becomes possible due to Zakharov-Benney resonance. The conditions of soliton stability in bulk medium are determined by