

SUMMARY

Basiladze G.D., Dolgov A.I., Berzhansky V.N. **Calculation of optical characteristics of multi-port single-mode 1xN coupler** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 17-28.

The optical characteristics of the multi-port 1xN fiber-optic coupler have been studied as function of the optical characteristics of the single-mode 1x2 couplers which it is composed of. Analytical expressions to calculate the optical characteristics of 1xN couplers with consideration of the tolerance deviations of the optical power losses from the nominal ones, and the optical power split between the output ports of the 1x2 couplers have been obtained. In addition, the polarization sensitivity of 1x2 couplers and the scatter of optical power losses in the interconnections of 1x2 couplers within the cascaded 1xN coupler.

Keywords: single-mode fiber-optic coupler 1xN, excess loss, insertion loss, uniformity.

Berzhansky V.N., Burlay M.N., Lagunov I.M., Lyashko, D.A., Polulyakh S.N., Sorokin Yu.V. **Computer technique and modern information technologies at the teaching of students on "Applied physics" speciality** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 156-165.

Continuous program of computer and information technique teaching at the training of students on "Applied physics" speciality is presented.

Keywords: didactics, computer, information technique, applied physics.

Berzhansky V.N., Vlasova T.A., Aleksashkin I.V., Tupitsyn Yu.V. **The magnetostatic properties of the ferrofluids** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 29-34.

The experimental results of research of the properties of the ferrofluids – magnetite colloid dispersion in benzol are given. Magnetization curves are alike superparamagnetic ones. The estimation of particles size was made by magnetic method. The data obtained is in accordance with the results of X-ray analysis.

Keywords: ferrofluid, superparamagnetic, magnetization curves.

Berzhansky V.N. and Sorokin Yu.V. **Estimation of parameters of exchange interactions in cadmium selenochromites** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 150-155.

The method of definition of 3d-electronic transfer parameters and exchange interactions on concentration dependence of Curie temperature is offered. By method LCAO it is shown, that the reason of change of Curie temperature in system Cd_{1-x}MexCr₂Se₄ is valence change of the nearest chromium ion.

Keywords: 3d-electronic transfer parameters, exchange interactions, covalence effects, chromium.

Berzhansky V.N., Evstafev I.I. and Norden D .V. **Estimation of parameters of exchange interactions in cadmium selenochromites** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 161-164.

The methods of evaluation s-d. exchange interaction for magnetic semiconductors are proposed. The methods are based on analysis of temperature and magnetic field dependences of conductivity. *Keywords:* 3d-electronic transfer parameters, exchange interactions, covalence effects, chromium.

Burym, Yu.A., Dubinko, S.V. and Mitsai, Yu.N. **Processes of magnetizing garnet ferrine films grown on (112) substrates** // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 35-43.

The magnetization processes in films grown on substrates with the (112) orientation have been studied experimentally and theoretically; the methods to determine the easy magnetization axis orientation are offered. The areas where the non-uniform magnetic phase exists in tilted magnetic fields have been found.

Keywords: epitaxial garnet ferrite film, domain structure, magnetic anisotropy.

Chucklov V.A., Ponomarenko V.I. Fluctuations of intensity of a plane wave in environment with large-scale random heterogeneities // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 141-149.

The problem about fluctuations of intensity of a plane wave in environment with large-scale random heterogeneities is resolved, which one is described by a Gaussian correlation function of an index of refraction. On the basis of matching outcomes of calculations conducted by two ways, the distribution of fluctuations of a field is investigated. It is noted, that in case of single dissipation the distribution law is normal. At average values of a distance the deviation from the normal law takes place. At large distances the distribution law comes nearer to normal.

Keywords: fluctuations, large-scale non-uniformity, distribution law.

Ivanov U.B., Nasonkin V.A., Boborykina O.V. New results in the research of the long-wave processes in the Black Sea // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 50-58.

The results of computational experiments and instrumental observations of registration of intrinsic oscillations of the Black Sea are given. This data refers to period's diapasons/ranges/spectral bands, which have never been investigated before.

Keywords: laser interferometer, intrinsic oscillations, earthquake forecast.

Khan S.A., Shulyak D.V. Model atmosphere of CP star HD101065 // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 129-140.

The model atmosphere of extremely peculiar roAp star HD101065 is calculated. Accounting of opacity with individualized abundances is executed by "line-by-line" method. Due to lack of data for the REE lines we scaled D.R.E.A.M. data base by ten. The synthetic spectrum and indices in photometric system *uvby* was calculated: $b-y = 0.713$, $m_1 = 0.336$, $c_1 = -0.121$. The good agreement between an observation and modeling is obtained.

Keywords: peculiar star, model atmosphere, individualized abundances, HD101065.

Korostelina T.A., Zimbal V.V., Glumova M.V., Eydokimenko L.V. Integrate course conception "Physics and Astronomy" for the class of socially - liberal school // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 175-182.

Basic idea's integrate course conception "Physics and Astronomy" for the class of socially - liberal school are present.

Keywords: integrate course, "Physics and Astronomy", class of socially - liberal school.

Lelyakov A.P. Radial motion of a closed string in a zone of interaction of collide plane waves // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 59-62.

In this article, the exact solutions (case of radial motion) equations which one describe dynamics closed of a string in the Bertotti - Robinson metrics, that sets in a zone of interaction of collide plane waves in Einstein-Maxwell theory, are obtained. The obtained solutions can be use as in a cosmology of extended objects, and as the test solutions.

Keywords: string, exact solutions, cosmology.

Lyashko, D.A. Optimization images of the echelle spectrum // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. P. 63-68.

The algorithm of the relation a signal noise before extraction orders of the echelle spectrum. The heuristic approach for allocation of sites of the image, free from spectral lines is described Is used. Then on the selected sites filter Whittaker is applied to smoothing a signal in each line CCD along an axis of dispersion. Automatic recognition of defects of a matrix and tracks of space beams is in passing made

Keywords: echelle spectrum, smoothing, extraction.

Mazinov A.S., Lisovets E.V. Thin-film structure on the basis of amorphous silicon // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 69-74.

The industrial method and equipment for obtaining solar thin-film batteries is reviewed on the basis of hydrogenized amorphous silicon, deposited method of a magnetron sputtering. A feature of a tendered technique is the capability of production of the bedded structures presenting the completely finished photoelectric generator, in a unified work cycle.

Keywords: solar cells, amorphous silicon, magnetron sputtering.

Milyukov V.V. Regularization method in tasks of synthesis of a magnetic fields // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. - 2003. - Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 75-78.

The tasks of synthesis of a homogeneous and linearly varied field in the solenoid are considered in the work. It is shown on examples, that standard methods of the decision of such tasks yield practically unsuitable results. It is shown, that at use of a Tikhonov regularization method the task of synthesis of a field is solved satisfactorily even at small values of currents. The way of calculation of regularization parameter from a condition of a discrepancy minimum on the expanded range of definition of a field is offered.

Keywords: synthesis, a homogeneous magnetic field, regularization method.

Milyukov V.V. The device for creation of a magnetic field, a homogeneous sphere in volume // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 79-80.

In work the device is optimized, allowing to increase uniformity of a magnetic field on comparisons with Gel'mgol'ts coils, at least, on the order and allowing to synthesize a homogeneous field practically in all volume of a sphere.

Keywords: synthesis, a homogeneous magnetic field, Gel'mgol'ts coils.

Mochalov, A.A., Koval, S.S. The investigation of phase transition peculiarity in central region of ingot // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 81-86.

The mathematical model of phase transition in two-component condenser matter is developed. The dependence of the crystallization process on geometric parameters of ingot and heat physics property of alloy is predicted. The negative liquation phenomenon in the defined region of ingot is proved by the results of the numerical simulation.

Keywords: mathematical model, phase change.

Panenko D.V. Interferometric atmospheric turbulence investigation with the use solar light // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 87-93.

A method of distant measuring of some optical non-stability and atmospheric turbulence parameters during daytime has been developed. The method is based on application of the interferometer coherence with a small angular aperture. Measurements of spatial coherence degree during observations of the direct solar light with the following interferograms interpretation have been made. Measurements of atmospheric coherence diameter by Fried have been made. It is shown experimentally that light diffusion due to the Sun halo is of a partial coherency. A criterion of optical non-stability based on measurements of light coherence diffusion by Sun halo is proposed. The interferometer can be applied for investigations of light diffusion in turbulent atmosphere.

Keywords: atmosphere, non-stability, distant measurement, solar interferometer, coherency halo light, diffusion.

Ponomarenko V.I., Popov V.V., Rudenko V.V. Processing of relations „frequency - signal” at measurements of a reflection coefficient in the waveguide // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 94-102.

The technical equipment and the software for processing of experimental multiresonant analogue relations at measurement of a complex reflection coefficient in the waveguide are offered in the article.

Keywords: superhigh frequencies, material constants, resonance characteristics.

Vinogorodsky D.F., Ponomarenko V.I., Popov V.V. An investigation of the dispersion of the dielectric permittivity of substances by the multiresonance method. // waveguide // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 156-160.

The paper offers a technique for measuring the dispersion spectra of the dielectric permittivity of substances. The technique is based upon measurement of the reflection coefficient by multiresonance method from a sample placed in a waveguide. It has been shown that an accuracy of the measurements, when SNA of the type R2-54/3 (X-band) is used, is close to one demonstrated when contemporary VNA is used.

Keywords: microwaves, dielectric permittivity, multiresonance method.

Reznic D.V., Lozovski V.Z. and Glumova M.V. Dispersion relations for mode of electromagnetic wave propagation in superconductivity plate // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 103-112.

Dispersion relations for mode of electromagnetic wave propagation in superconductivity plate are present.

Keywords: dispersion relation, superconductivity plane, absorption factor.

Roshchupkin, S.N. The string in a theoretical physics // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). - № 1. – P. 3-16.

Recent progress on string theory in curved space-time reviewed. The string and null-string dynamics in cosmological and black hole space-times is investigated. At is shown that the perfect gas of noninteracting null-strings may be considered as an alternative source of the gravity in the FRW universes with $k=0$. String dynamics in a curved space-time is studied on the basis of an action functional including the small parameter of rescaled tension. It is shown that in the known equation for geodesic deviation but complemented by a string oscillatory term. These equations are solved for the de sitter and FRW spaces.

Keywords: the theory of strings, exact solutions, cosmology.

Taran Ye.P., Starostenko V.V., Grygoriev Ye.V., Rukavishnikov A.V. Influence of parameters of a nonuniformity of conductive microstructures of integrated circuits on curve Wunsch-Bell // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). – № 1. – P. 113-121.

In the article on the basis of numerical model of effect of pulse electromagnetic fields on integrated circuits the relations of specific threshold power to pulse duration (curve Wunsch-Bell) for a microsegment of an inhomogeneous conductive film are obtained. The influence of the geometrical sizes of inhomogeneous microsegments on threshold values of *intensity* of a pulse electromagnetic field is detected.

Keywords: a pulse electromagnetic field, curve Wunsch-Bell, inhomogeneous conductive microstructures, specific threshold power.

Terez E.I., Gushchin G.K., Terez G.A. On dynamics of Spectral Atmospheric Transmission Variation in the Crimea // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). – № 1. – P. 122-128.

An observational analysis of atmospheric transmission data obtained in the Crimea is made. It is shown that in 1924- 1932 when there was not practically any industry spectral atmospheric transmission (SAT) data can be assumed as background values. In 1972 -1990 the anthropogenic loading was maximum. During the period a significant SAT decrease was observed. In the course of "perestroyka" beginning from 1996 SAT values returned to their former background values.

Keywords: spectral atmospheric transmission, background values, anthropogenic loading.

Yevdokimov S.V., Yatsenko A.V. The apparatus for the short-circuit photocurrent investigation in ferroelectric crystals // Uchenye zapiski Tavricheskogo Natsionalnogo Universiteta im. V.I. Vernadskogo. – 2003. – Series «Fizika». – V. 15–16 (54-55). – № 1. – P. 44-49.

The apparatus for the experimental investigation of the short-circuit photocurrent in ferroelectric crystals is described. The apparatus consists of an optical system, registration device, interface and driving device. Driving device and interface designed by the integrated circuits of K1113, K572, K561 and K1533 series using.

Keywords: ferroelectrics, photogalvanic effect, step engine, interface.