SUMMARY
THERMOELASTIC EQUILIBRIUM OF A TRANSTROPIC ELLIPTIC CYLINDER
Gorgidze D.A., Gulua N.G. and Kvartskhava L.G.
Georgian Technical University
Connection of mechanical processes with thermal ones manifested in thermoelastic effects is discussed. In the result of deformation, changes in heat conductivity and hence in the temperature field take place. In addition, during deformation, heat is released. Due to the change in the temperature field, temperature deformation takes place, and there emerges temperature stress. The exact solutions obtained allow solving some particular boundary value problems of the theory of thermoelasticity for transtropic bodies bounded by the coordinate surfaces of a cylinder-elliptic coordinate system.
Keywords: thermoelastic equilibrium, transtropic body, elliptic cylinder, exact solutions.

SUMMARY
ELECTROELASTIC EQUILIBRIUM OF A CYLINDRICAL PANEL
Gorgidze D.A., Kvartskhava L.G. and Gulua N.G.
Georgian Technical University
The article deals with the electroelastic equilibrium of a cylindrical panel in the cylindrical coordinate system. For determination of the constants, an infinite algebraic system with a quasi-diagonal matrix is derived. By direct verification we see thatthe determinant of the system is different from zero.
Keywords: cylindrical panel, electroelastic equilibrium, infinite algebraic system, quasi-diagonal matrix..

SUMMARY
GENERAL METHOD OF STATISTICAL DATA PROCESSING AND ANALYSIS
Buadze T.G.
Georgian Technical University
The article deals with a general statistical method of processing, analysis and prediction of statistical data by the example of academic groups randomly selected from electronic base of students' testing.The offered general statistical method allows predictingthe probability distribution of basic characteristic factors and components of the teaching-academic process and establishing the correlation dependence between them.
Keywords: statistical data, Gaussian distribution, arithmetic mean, corrected standard deviation, confidential interval, Student's criterion.

SUMMARY
ON THE OPTIMAL SOLUTION TO LINEAR PROBLEMS OF BOOLEAN PROGRAMMING
Mestiashvili K.V., Mtvralashvili T.I. and Mestiashvili V.K.
Georgian Technical University
For optimal solution of the Boolean programming problem in both one- and multi-dimensional cases, there is offered an iteration method that is easily realized and more effective than the known ones. Moreover, the method does not require the compilation of tables.
Keywords: linear programming, Boolean variables, iteration process, objective function.

CODE SCHEME BASED ON THE RINGS OF GAUSSIAN INTEGERS AND CONTINOUS PHASE MODULATION

Shavgulidze S.A. and Asanidze A.V.
Georgian Technical University

Abstract. The ½ rate channel encoder over the ring of integers modulo 4 combined with a 4-ary continuous phase modulation scheme (CPM) is considered. We are designing a serial interleaved concatenated channel code scheme, with inner CPM and outer non-binary convolutional encoder. Hard decoding techniques based on the Viterbi algorithm are investigated. We present the simulation results over additive white Gaussian noise channel and the Rician fading channel. The results can be easily generalized for the codes over Gaussian integers.
Keywords: convolutional codes, continuous phase modulation, concatenated codes, Viterbi decoder.

SUMMARY

APPLICATION OF DIFFERENTIAL EQUATIONS OF DIFFERENT TYPES TO THE APPROXIMATION OF THE GEOMETRIC SHAPE OF ORTHOPEDIC SHOE PADS

Shalamberidze M.M., Sokhadze Z.P. and Lomtadze N.Z.

Akaki Tsereteli State University, Kutaisi

The article presents the approximation of the trace of the orthopedic shoe pads through the integral curves of the solutions of the first-order differential equations. These curves allow describing accurately the traces of the pads as well as give an opportunity, in an unlimited number, to change the shapes of the traces of orthopedic pads in the transition from one size to another.

Keywords: orthopedic footwear, shoe pads, differential equations.

SUMMARY

THE EFFECT OF THE PARAMETERS OF E-SUPPLY NETWORK ELEMENTS ON THE GENERATION OF HIGH-ORDER HARMONICS OF HIGH VOLTAGE

Chunashvili B.M., Bezhanishvili J.G., Petrosyan A.M. and Gamrekelashvili T.G.

Georgian Technical University

To determine the effect of the parameters of the 10/10.4 kV e-supply network and the consumers connected to it on the generation of high-order harmonics, the design and the replacement scheme of a typical transformer substation were elaborated. The electrostatic equipment was taken as the source of load current distortion. There are given formulae for calculation of the values of amplitudes of harmonics of the high-frequency spectrum and the percentage of the coefficient of nonsinusoidality of the distribution bus load.

Keywords: power supply, e-network, parameters of network elements, harmonics, nonsinusoidality.

RADIATION OF ENERGY: QUANTUM PROCESSES

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Georgian Engineering Academy

Abstract. Determination of the interaction between two energy levels, considered as the difference between the levels, is discussed from the standpoint of quantum processes. For large quantum numbers, the difference between two neighboring levels gradually decreases, and the spectrum becomes continuous, i.e. for large quantum numbers, the character of the spectrum is similar to that in classical physics. In quantum mechanics, there are physical quantities the accurate measurement of which prevents knowing the values of other physical quantities. The physical quantities characterizing the state are essentially different in different problems. When the wave function is known, the state is determined, and it is possible to determine a complete set of physical quantities. Thus, when the wave function for the system is given, we have a pure state, and, when the system has no wave function, we have a mixed state.

Keywords: energy, radiation, quantum processes.

OPTIMIZATION OF TELECOMMUNICATION TRANSPORT NETWORKS USING THE BRANCH AND BOUND METHODS

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Georgian Technical University

Abstract. The active use of the Internet and the dynamic development of the telecommunications impose strict requirements on the telecommunication transport networks, which is due to the increasing multiservice traffic in the network. Therefore, integration of the technologies used by telecommunication operators is one of the most important issues of the optimal planning of the telecommunication transport networks. In this work, a mathematical model of the telecommunication transport network is constructed and the optimization problem is solved by using the branch and bound methods.

Keywords: telecommunication transport networks, optimization, multiservice traffic, branch and bound method.

SUMMARY

A BRIEF OVERVIEW OF ADJARA'S NATURAL-GEOLOGICAL PHENOMENA

Loria M.D.

Shota Rustaveli State University, Batumi

The article briefly discusses the natural-geological phenomena of Adjara, the causes and consequences of their origin.

Keywords: natural-geological phenomena, soilerosion, landslide, sandgrazingzones, coastalzone, climate cchange, geologicalstructure.

SUMMARY
ON THE ADVISABILITY OF REASSESSMENT OF HYDROPOWER RESOURCES OF GEORGIAN RIVERS
Lomidze I.B., Khelidze G.K. and Pipia B.J.
Georgian Technical University
The theoretical potential of hydropower resources of Georgian rivers were last assessed in 1987. Recently, climate change studies showed thatthe climate change (global heating) causes the decrease in water resources. From 1970 to 2005, the average temperature in Western Georgia increased by 0.2°C, while total annual precipitation decreased by 27 mm. It is noteworthy that in Georgia hydrological observations of most rivers have not been carried out since early 90-ties of the last century, which complicates the accounting and forecast of water resources. Taking into consideration all the above-mentioned factors, it is urgent to reassess the energy potential of main Georgian rivers with account for the available hydrological data.
Keywords: hydropower resources, assessment, climate change, ambient temperature.

ECOLOGICAL WATER CONSUMPTION AND MAIN DETERMINING FACTORS
Lomidze I.B., Khelidze G.K., Chokheli Kh.O. and Mardaleishvili M.R.
Georgian Technical University
Due to the lack of the legislative framework for environment protection, there emerge serious obstacles in the process of solving simultaneously the energy and ecological problems from the point of view of the rational use of water. This fact creates an artificial barrier to the development of hydropower. The analysis of ecological water consumption in 24 countries showed that, to determine the volume of ecological water consumption, it is appropriate to take into consideration the length of an individually dewatered river section for water intake gates, a natural climate zone, local landscape and habitat conditions of ichthyo-fauna, inhabited localities, agricultural grounds, water management facilities, etc. The issue of ecological water consumption should be considered comprehensively for each object taking into account energy-economic feasibility and ecological risk factors.
Keywords: runoff, river, ecological water consumption, environment protection, hydropower station, water management.

SUMMARY
BIOLOGICAL WASTE AS A SIGNIFICANT FEED RESOURCE
Andguladze Sh.N., Bazgadze I.G. and Kolova S.M.
Georgian Technical University
South Ural State University, Cheliabinsk, Russia
The technological method of processing the waste of animal husbandry (and different branches of food industry) and resulted products is considered. The method provides obtaining of valuable feed resources. The offered technology of processing the biological waste is based on the extrusive method.
Keywords: biological waste, feed resource, processing, technology, extrusive method.

SUMMARY
OPTICAL ABSORPTION SPECTRA OF INDIUM ARSENIDE IRRADIATED WITH HIGH-ENERGY ELECTRONS
Kekelidze N.P., Sadradze K.G. and Kvirkvelia B.V.
Georgian Technical University
Ferdinand Tavadze Instityte of Metallurgy and Materials Science
Iv. Javakhishvili Tbilisi State University
The optical absorption spectra of indium arsenide before and after irradiation with high-energy electrons with energy of E=50 MeV and $\Phi=4\cdot10^{17}$ el./cm^2 were studied over a wide spectral range. Plasma absorption was detected in the long wavelength range and analyzed. In the medium wavelength range, selective absorption on the radiation defect with the energy $E_c \approx 0.23$-0.24 eV was detected. From the analysis of the short wavelength range, it follows that, in the result of irradiation, point-type defects playing the role of radiation donors are mainly formed.
Keywords: optical absorption spectra, indium arsenide, point defects, high-energy electrons.

SUMMARY

QUANTITATIVE ANALYSIS OF SCATTERING MECHANISMS OF ELECTRONS IN INDIUM ARSENIDE SINGLE CRYSTALS

Kekelidz N.P., Sadradze K.G. and Kvirkvelia B.V.

Georgian Technical University

Ferdinand Tavadze Institute of Metallurgy and Materials Science

Iv. Javakhishvili Tbilisi State University

In InAs single crystals, in which electron concentration varied over a wide range from 10^{16} to $10^{19}cm^{-3}$, we computed the components of carrier mobility corresponding to the scattering of electrons by polar lattice vibrations, acoustic lattice vibrations, ionized impurities (both in lightly and heavily doped materials), neutral centers, and also to scattering of electrons by electrons. Besides, we assessed piezoelectric scattering, dislocation scattering and scattering by alleged inhomogeneity. Theoretical values of total mobility were determined and compared with experimental data. The correlation was good.

Keywords: electron scattering, mobility, effective mass, indium arsenide, single crystal.

MATHEMATICAL-CHEMICAL INVESTIGATION OF HYDROGEN HALIDES

Gverdtsiteli M.I., Kvernadze M.S. and Kizikurashvili V.N

Iv. Javakhishvili Tbilisi State University

Abstract. The mathematical-chemical investigation of hydrogen halides was carried out within the scope of the ANB-matrices method. Five correlation equations of the structure-properties type were derived. The correlations are satisfactory.

Keywords: hydrogen halides, ANB-matrices, correlation equations.

MATHEMATICAL-CHEMICAL INVESTIGATION OF ARSENIC (III) HALIDES

Sidamonidze N.N., Koiava N.A., Rtskhiladze N.I. and Gverdtsiteli M.I.

Iv.Javakhishvili Tbilisi State University

Tbilisi State Medical University

Abstract. The mathematical-chemical investigation of arsenic (III) halides was carried out within the scope of the ANB- and GANB-matrices methods. Six correlation equations of the structure-propertiestype were derived. The correlations are satisfactory.

Keywords: arsenic (III) halides, ANB-matrix, GANB-matrix, correlation equations.

SUMMARY

MATHEMATICAL-CHEMICAL INVESTIGATION OF SOME DERIVATIVES OF 2–P-NITROPHENYLINDOLE

Chikvaidze I.Sh., Khitiri G.Sh., Samsonya Sh.A. and Gverdtsiteli M.I.

Iv. Javakishvili Tbilisi State University,

P. Melikishvili Institute of Physical and Organic Chemistry

Mathematical-chemical investigation of the derivatives of 2–p-nitrophenylindole was carried out within the scope of $\tilde{\mathbf{ANB}}$ -matrices method. Two correlation equations were derived and investigated. Correlations are satisfactory.

Keywords: derivatives, 2–p-nitrophenylindole, $\tilde{\mathbf{ANB}}$-matrix, correlation equation.

NEW NONTOXIC MACROCYCLIC AZOMETHINES

Chelidze N.T., Ochkhikidze N.T., Matitaishvili T.R., Didebulidze K.A. and Elizbarashvili E.N.

Agricultural University of Georgia

Abstract. The 24-membered macrocyclic Schiff bases and their metal complexes were synthesized from dihydroxyl derivatives of bisphenol or azobenzene under the conditions of the Reimer–Tiemann reaction and cyclization with diamines. The antibacterial activity of the Schiff base and its complexes against *E.coli, S.aureus,* and *P.aeruginosa* were studied. It was found that nor macrocyclic azomethines nor their complexes showed antibacterial activity.

Keywords: macrocyclic azomethines, Schiff bases, metal complexes, antibacterial activity.

SUMMARY

SYSTEMATIC STUDY ON THE FABRICATION OF DRUG DELIVERY MICROCAPSULES MADE OF AMINO-ACID-BASED BIODEGRADABLE POLYESTER AMIDE

Sinauridze N.O., Kantaria Tem.J., Kantaria Ten.J., Badzgaradze S.A., Kutsiava N.A.,
Tugushi D.S. and Katsarava R.D.
Agricultural University of Georgia
Georgian Technical University

The article deals with a systematic study on the fabrication ofmicr for numerous drug delivery applications. The microcapsules were made of biodegradable poly(ester amide) constituted of amino acid leucine, 1,6-hexanediol and sebacic acid using a water-in-oil-in-water (w/o/w) double emulsion–solvent evaporation method. The influence of various parameters such as the concentration of the polymer in the organic phase (dichloromethane), the concentration of the surfactant in the water phase, the nature of the surfactant in the water phase,and the homogenization rate of the secondary emulsion were studiedin terms of the size and size distribution of the microspheres.
Keywords: drug-delivering microspheres, biodegradable poly(ester amide), fabrication of microspheres, w/o/w method.

SUMMARY

ANTIBACTERIAL ACTIVITY OF VOLCANIC AND SLIT PELOIDS OF GEORGIA

Devdariani N.G., Jincharadze D.G., Zakalashvili T.T. and Bokuchava N.V.
Georgian Technical University

The experimental study of the antibacterial properties of volcanic and silt peloids of Georgia was performed. The study revealed that, in volcanic mud, antibacterial properties are insignificant, while slit mud provides congenial conditions for the growth of gram-positive bacteria.
Keywords: peloids, antibacterial activity, humic acids, fulvic acids.

SUMMARY

JUICES PRODUCED FROM ECO-FRIENDLY FRUIT AND BERRIES BY INNOVATIVE TECHNOLOGY OF CONCENTRATION OF POLYPHENOLS

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The innovative technology for producing juices producing juices from eco-friendly black mulberry and blackberry by concentration of phenolic substances having a high antioxidant activity was developed. To prepare research objects - test and control juice samples, we used eco-friendly raw materials: black mulberry (Sagarejo) and blackberry (Kaspi). The control samples were prepared using a standard technology; the test samples – using the innovative technology we elaborated. The amount of phenolic compounds in the research objects was investigated by the method of HPLC, and the antioxidant activity was studied by using a stable radical (DPPH). The amount of phenolcarbonic acids and catechins, as well as the antioxidant effect in test samples where higher than in the control ones. In the juice samples prepared using the innovative technology, the total amount of phenolcarbonic acids increased mainly at the expense of the increased amount of chlorogenic, gallic, coumaric and vanillic acids; the amount of catechins – at the expense of the increased amount of both catechins. We have got a patent (P 5236, Sakpatenti, 2011) for this innovative technology.
Keywords: fruit and berries, juice, phenolic compounds, antioxidant activity.

SUMMARY

TECHNOLOGY OF PRODUCTION OF A NATURAL VITAMIN FOOD SUPPLEMENT

Kintsurashvili N.J., Ergemlidze T.D., Karchava M.S. and Berulava I.O.
Akaki Tsereteli State University, Kutaisi

The technology of production of a natural vitamin food supplement based on wheat bran and starch paste, containing a lyophilic cornel concentrate, was developed. The technology provides high bioaccessibility of vitamin C in the supplement, which is due to that first the vitamin complex is extracted from cornel fruit and introduced in mechanically activated wheat bran or starch paste. Then the paste is subjected to lyophilic drying. The food supplements produced are intended to enrich a wide range of therapeutic and prophylactic products. They can be used for nutrition of both children and adults.
Keywords: food supplement, vitamin, cornel, wheat bran paste, starch paste.

SUMMARY

TECHNOLOGY OF PRODUCTION OF A NATURAL MINERAL FOOD SUPPLEMENT

Kintsurashvili N.J., Ergemlidze T.D., Karchava M.S. and Berulava I.O.

Akaki Tsereteli State University, Kutaisi

The technology of production of a natural mineral food supplement based wheat bran and starch paste, containing a lyophilic concentrate of Lugela mineral water, was developed. The concentrate based on the starch paste contains 63.97±1.15% CaCL2, i.e. 36.9±1.3%Ca, and the concentrate based on the wheat bran paste – 10.15±0.22% CaCl2, i.e. 5.8±0.16% Ca. The food supplements produced are intended to enrich a wide range of therapeutic and prophylactic products. They can be used for nutrition of both children and adults.

Keywords: food supplement, mineral water, wheat bran paste, starch paste.

SUMMARY

PATHOMORPHOLOGICAL CHANGES IN DISEASED PLANTS

Kanchaveli Sh.S.

Scientific Research Centre of Agriculture

Dysplasia and changes in the shape of plants as well as cytological changes take place as a result of the disease. The main types of changes of a diseased plant are the following: hypertrophy, hyperplasia, hypoplasia, metaplasia, degeneration and necrosis. Pathogenic changes of fruit trees when diseased artificially with tracheomicotic fungi were studied. It was found that the first pathological changes in plant tissues appear in 4-5 days after being diseased, which gradually intensified and caused clogging of xylem vessels with gummy-like substances and necrosis of wood. The latter spreads both in vertical and horizontal directions. These processes proceed more intensively in stone cultures than in seed ones.

Keywords: plant diseases, pathogenic changes, cytological changes.

SUMMARY

PHYSIOLOGICAL AND BIOCHEMICAL CHANGES IN DISEASED PLANTS

Kanchaveli Sh.S.

Scientific Research Centre of Agriculture

The changes in physiological and biochemical processes in plants in case of a tracheomicosis disease are studied. It was determined that, as a result of the disease, the amount of common and free water in the plant reduces, while the amount of binding water increases. The intensity of transpiration and photosynthesis and the content of pigments decreases, the penetrability of the cell membrane increases. At the initial stage, the breathing process becomes stronger, but, at the next stage, it slows down. The disease also affects the activity of enzymes participating in the oxidation-reduction process and the content of vitamin C. As a result of the disease, the activity of catalase and polyphenol oxidase decreases, while the activity of peroxidase increases. As for vitamin C, its content decreases. Amino acids and organic acids change in quantity and quality, but the amount of phenyl increases. Physiological as well as biochemical processes change more in stone fruit trees than in seed ones. This phenomenon is due to the fact that seed cultures are more resistant than stone ones. Physiological and biochemical changes caused by the disease affect the plant adversely, in particular, synthesis processes decrease, while hydraulic processes increase.

Keywords: plant diseases, physiological processes, biochemical diseases, adverse effect.