

USSR

UDC 619:576.858.4:637

TSVETKOVA, S. A. and SOBKO, A. I., All-Union Foot-and-Mouth Disease Scientific Research Institute

"Detection of Foot-and-Mouth Disease Virus in Animal Slaughter Products"

Moscow, Veterinariya, No 1, 1972, pp 35-36

Abstract: Dependable detection of foot-and-mouth disease virus is largely related to the way the material is prepared for examination, chiefly the method used to purify and concentrate the virus in the substrate. The use of freon 113 (which promotes dissociation of virus antibody complex) to eliminate ballast proteins in suspensions from organs and tissues of infected animals was tested and polyethylene glycol was used to concentrate the virus by precipitation. Lymph nodes, bone marrow, thyroid tissue, lungs, heart, spleen, etc. obtained from cattle infected with foot-and-mouth disease virus and slaughtered in different stages of the disease were examined. Suspensions from these organs and tissues were purified and concentrated with freon 113 and polyethylene glycol and then titrated in suckling mice. Virus in these suspensions had higher infectious activity than virus in control suspensions from the same sources that were not purified and concentrated.

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Veterinary Medicine

USSR

UDC 619:616.988.43-074

SOBKO, A. I. and PROKHOROV, V. N., All-Union Scientific Research Institute of Food-and-Mouth Disease

"Method for the Identification of Food-and-Mouth Disease Virus Strains"

Moscow, Veterinariya, No 5, May 71, pp 110-113

Abstract: The suitability of the diffusion precipitation reaction for determining the type of virus strain was studied directly in pathological samples and in the serum from diseased animals (cows, swine, guinea pigs, sheep). A diffusion precipitation procedure was developed for inactivating the antigens for the test, thereby guaranteeing avirulent preparations. Differences in structure of the subtypes of the virus which can be precipitated were also studied. Lymph from diseased animals was suitable as antigenic material in the test. It was found that samples of the aphthous lymph of cattle and guinea pigs, which had been kept at  $-20^{\circ}\text{C}$  for two years, did not lose ability to precipitate. Other materials used as antigens for identifying foot-and-mouth disease virus directly in pathological material included saliva, tissue, and 50% suspensions in physiological solution of material from the internal organs of diseased animals. The reaction of diffusion precipitation in agar is a

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SOBKO, A. I., et al, Veterinariya, No 5, May 71, pp 110-113

simple, highly sensitive, and specific method for identifying the various strains of foot-and-mouth disease virus. In pathological material, the best results were obtained when hyperimmune type-specific sera of guinea pigs and antigens from lymph and pancreas of diseased animals were used. Sera from diseased animals can be successfully for retrospective type-identification of virus strains. The best results were obtained with antigen prepared from purified and concentrated lapinized foot-and-mouth disease virus, which was inactivated by keeping the concentrate at 58°C for a period of 4 hours. In this way an avirulent antigen with its original precipitating activity could be produced. A qualitative difference was discovered in the structure of the precipitating agent of subtypes of the virus.

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USSR

SEMILETENKO, V. G., SOBKOLOV, B. N., USKOV, V. N., Leningrad Mechanics Institute

"Particulars of Unstable Interaction Between a Supersonic Jet and an Infinite Obstacle"

Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, Seriya Tekhnicheskikh Nauk, No 13(208), Issue 3, Oct 72, pp 47-51

Abstract: The paper gives some of the results of experimental studies of the process of unstable interaction between an airjet and an infinite barrier. The results apply primarily to the frequency and amplitude characteristics of wave structure oscillation in the jet preceding the obstacle and pressure oscillations on the boundary. Pressure oscillations on the barrier were measured and the wave structure in the jet was visualized by the IAB-451 shadow device and the SFR-1M high-speed camera. Pressure pulsations on the barrier were measured by LKh-601 piezoelectric sensors and recorded on the S-1-4 oscillograph. Frequency responses were tape-recorded and decoded on the ASChKh-1 spectrum analyzer. The passband of the recording equipment was 20 Hz to 20 kHz. The experiments were done on airjets with  $M_a = 1-3$  and  $n = 1.5-20$ .

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Aeronautical and Space

USSR

SEMILETENKO, B. G., SOBKOLOV, B. N., USKOV, V. N.

"Interpretation of the Shock-Wave Processes Which Accompany Unstable Interaction Between a Jet and an Obstacle"

Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, Seriya Tekhnicheskikh Nauk, No 13(208), Issue 3, Oct 72, pp 39-41

Abstract: When a supersonic jet strikes a flat obstacle with dimensions much greater than the maximum diameter of the jet, there is an abrupt drop in the frequency of pressure oscillations and an increase in their amplitude when the jet nozzle reaches a certain distance from the barrier. In this situation, the shock wave structure is strongly diffused, and the central shock wave fluctuates with a large amplitude at a frequency corresponding to that of the pressure oscillations. Such a mode of interaction has been termed strong instability. In this mode when the pressure in the center of the obstacle is lower than at the periphery blocking of the central region is observed as a result of adhesion of the tangential discontinuity to the surface of the obstacle. Adhesion takes place at a distance from the jet axis approximately equal to the maximum radius of the

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SEMILETENKO, B. G. et al., Izv. SO AN SSSR, Ser. Tekhn. Nauk, No 13(203),  
Issue 3, Oct 72, pp 39-41

jet. This paper proposes a possible interpretation of the shock-wave processes accompanying such a collapse of the tangential discontinuity. The proposed hypothesis can be used to explain the pattern of sound emission in the ambient medium during the interaction process. The shock waves which arise during the process are reflected from the surface of the obstacle into the surrounding medium. One or more waves may result, depending on the number of reflections of a shock wave in the period of a single oscillation. While the proposed interpretation applies to obstacles much larger than the maximum jet diameter, the case of obstacles with dimensions comparable to the maximum jet diameter is basically similar.

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USSR

GINZBURG, I. P., SOBKOLOV, B. N., AKIMOV, G. A.

"Determination of the Principal Flow Parameters in a Supersonic Stream of an Ideal Gas"

Leningrad, Uchenyye Zapiski Leningradskogo Gosudarstvennogo Universiteta, No 357, SER. MAT. NAUK, No 46, 1970, pp 38-55.

Abstract: This work suggests a refined approximation method for calculating the principal flow parameters in a supersonic stream of an ideal gas. The task of the work includes primarily determination of the gas dynamic parameters in various areas of the stream, as well as determination of boundaries of jumps in the stream and compression.

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1/2 023 UNCLASSIFIED PROCESSING DATE--18SEP70  
TITLE--OPTICAL NO PRIME3 POSITIVE CENTERS IN CALCIUM TUNGSTATE -U-  
AUTHOR--(02)-MAKSIMOVA, G.V., SOBOL, A.A. S  
COUNTRY OF INFO--USSR  
SOURCE--IZV. AKAD. NAUK SSSR, NEORG. MATER. 1970, 6(2), 307-13  
DATE PUBLISHED-----70  
SUBJECT AREAS--PHYSICS, CHEMISTRY  
TOPIC TAGS--OPTIC PROPERTY, NEDDYMINUM COMPOUND, LUMINESCENCE, ABSORPTION,  
CRYSTAL STRUCTURE, CALCIUM COMPOUND, TUNGSTEN COMPOUND.  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1988/0544 STEP NO--UR/0363/70/006/002/0307/0313  
CIRC ACCESSION NO--AP0105529  
UNCLASSIFIED



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UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0105529

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE CAWO SUB4 MINUS ND PRIME3 POSITIVE CRYSTALS TO BE STUDIED WERE GROWN BY THE CZOCHRALSKI METHOD. THE ND PRIME3 POSITIVE IONS FORM IN CAWO SUB4 SEVERAL TYPES OF OPTICAL CENTERS. SEPD. OUT WERE THE SPECTRA FOR THE R-CENTER OF ND PRIME3 POSITIVE, WHICH IS ASSOCD. WITH THE FORMATION OF ND PRIME3 POSITIVE MINUS ND PRIME3 POSITIVE PAIRS. THE POSITION OF THE COMPONENTS OF THE PRIME4 F SUBTHREEHALVES, PRIME4 I SUBELEVEN-HALVES LEVELS FOR THIS CENTER WAS DETD. THE R-LINES ARE OBSD. IN SAMPLES WITH ANY GIVEN TYPE OF COMPENSATION OF THE EXCESS CHARGE OF THE ND PRIME3 POSITIVE ION. TWO ND PRIME3 POSITIVE MINUS V SUBCA (M-CENTERS) CENTERS WERE FOUND, WHICH ARE MOST NOTICEABLE IN SAMPLES WITHOUT COMPENSATION BY ADDNL. IMPURITIES. THE OPTICAL ND PRIME3 POSITIVE MINUS V SUBCA CENTERS ARE PRESENT ALSO IN THE CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NA PRIMEPOSITIVE CRYSTALS; HOWEVER, AT A LARGE CONCEN. OF ND PRIME3 POSITIVE AND NA PRIMEPOSITIVE THERE IS OBSD. A BROADENING OF THE ABSORPTION AND THE LUMINESCENCE SPECTRA IN CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NA PRIMEPOSITIVE CRYSTALS. THE TWO SIMPLEST ND PRIME3 POSITIVE MINUS NB PRIME5 POSITIVE CENTERS (THE N-CENTERS) WERE DETD. IN THE CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NB PRIME5 POSITIVE SAMPLES. AN AVERAGED SCHEMATIC FOR THE SPLITTING OF THE LEVELS PRIME4 F SUBTHREE-HALVES, PRIME4 I SUBNINE-HALVES, PRIME4 I SUBELEVEN-HALVES WAS CONSTRUCTED FOR THE N-CENTERS.

UNCLASSIFIED

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USSR

UDC 539.89

ALEKSANDROV, V. I., KAMINSKIY, A. A., MAKSIMOVA, G. V., PROKHOROV, A. M. (Academician), SARKISOV, S. E., SOBOL', A. A., TATARINTSEV, V. M., Physical Institute imeni P. N. Lebedev, and Institute of Crystallography imeni A. V. SHUBNIKOV, Academy of Sciences of the USSR, Moscow

"A Study of Stimulated Emission by  $Nd^{3+}$  Ions in Crystals at the  ${}^4F_{3/2} \rightarrow {}^4I_{13/2}$  Transition"

Moscow, Doklady Akademii Nauk SSSR, Vol 211, No 3, 21 Jul 73, pp 567 - 570

Abstract: The prevailing transition for neodymium is  ${}^4F_{3/2} \rightarrow {}^4I_{11/2}$  (about 60%), but the transition to  ${}^4I_{13/2}$  is of both practical and theoretical interest.

The authors studied doped crystals of  $CaF_2-YF_3$ ,  $Ca_2Y_5F_{19}$ ,  $Ca_5(PO_4)_3F$ ,  $ZrO_2-Y_2O_3$ , and  $HfO_2-Y_2O_3$ . Samples were tested at 77°K and 300°K. Laser action was observed at three frequencies near 1.35 microns in yttrifluorite, at two points in tysonite, and at several locations in fluorapatite with a 90° angle between the optical and geometric axes. Analysis of the low-temperature spectra showed that in all observations their lines were insensitive to concentration.

The cubic crystals of  $ZrO_2-Y_2O_3$  and  $HfO_2-Y_2O_3$  with  $Nd^{3+}$  ions showed very

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ALEKSANDROV, V. I., et al., Moscow, Doklady Akademii Nauk SSSR, Vol 211, No 3,  
21 Jul 73, pp 567 - 570

similar properties, and a spectrum is given for only the first of these. It shows  
lasing at both the transitions.

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172 023 UNCLASSIFIED PROCESSING DATE--18SEP70  
TITLE--OPTICAL ND PRIME3 POSITIVE CENTERS IN CALCIUM TUNGSTATE -U-

AUTHOR--(02)-MAKSIMOVA, G.V., SOBOL, A.A. S

COUNTRY OF INFO--USSR

SOURCE--IZV. AKAD. NAUK SSSR, NEORG. MATER. 1970, 6(2), 307-13

DATE PUBLISHED-----70

SUBJECT AREAS--PHYSICS, CHEMISTRY

TOPIC TAGS--OPTIC PROPERTY, NEODYMINUM COMPOUND, LUMINESCENCE, ABSORPTION,  
CRYSTAL STRUCTURE, CALCIUM COMPOUND, TUNGSTEN COMPOUND

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1988/0544

STEP NO--UR/0363/70/006/002/0307/0313

CIRC ACCESSION NO--AP0105529

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UNCLASSIFIED

PROCESSING DATE--18SEP70

2/2 023

CIRC ACCESSION NO--AP0105529

ABSTRACT/EXTRACT--(U) GP-0-

ABSTRACT. THE CAWO SUB4 MINUS ND PRIME3 POSITIVE CRYSTALS TO BE STUDIED WERE GROWN BY THE CZOCHRALSKI METHOD. THE ND PRIME3 POSITIVE IONS FORM IN CAWO SUB4 SEVERAL TYPES OF OPTICAL CENTERS. SEPD. OUT WERE THE SPECTRA FOR THE R-CENTER OF ND PRIME3 POSITIVE, WHICH IS ASSOCD. WITH THE FORMATION OF ND PRIME3 POSITIVE MINUS ND PRIME3 POSITIVE PAIRS. THE POSITION OF THE COMPONENTS OF THE PRIME4 F SUBTHREEHALVES, PRIME4 I SUBELEVEN-HALVES LEVELS FOR THIS CENTER WAS DETD. THE R-LINES ARE OBSD. IN SAMPLES WITH ANY GIVEN TYPE OF COMPENSATION OF THE EXCESS CHARGE OF THE ND PRIME3 POSITIVE ION. TWO ND PRIME3 POSITIVE MINUS V SUBCA (M-CENTERS) CENTERS WERE FOUND, WHICH ARE MOST NOTICEABLE IN SAMPLES WITHOUT COMPENSATION BY ADDNL. IMPURITIES. THE OPTICAL ND PRIME3 POSITIVE MINUS V SUBCA CENTERS ARE PRESENT ALSO IN THE CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NA PRIMEPOSITIVE CRYSTALS; HOWEVER, AT A LARGE CONCN. OF ND PRIME3 POSITIVE AND NA PRIMEPOSITIVE THERE IS OBSD. A BROADENING OF THE ABSORPTION AND THE LUMINESCENCE SPECTRA IN CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NA PRIMEPOSITIVE CRYSTALS. THE TWO SIMPLEST ND PRIME3 POSITIVE MINUS NB PRIME5 POSITIVE CENTERS (THE N-CENTERS) WERE DETD. IN THE CAWO SUB4 MINUS ND PRIME3 POSITIVE MINUS NB PRIME5 POSITIVE SAMPLES. AN AVERAGED SCHEMATIC FOR THE SPLITTING OF THE LEVELS PRIME4 F SUBTHREE-HALVES, PRIME4 I SUBNINE-HALVES, PRIME4 I SUBELEVEN-HALVES WAS CONSTRUCTED FOR THE N-CENTERS.

UNCLASSIFIED

USSR

UDC: 669.71.472(088.8)

BELOV, Yu. I., SOBOL', I. I., BAKHTIN, A. A.

"Method of Removal of the Lining of an Aluminum Electrolyzer"

USSR Author's Certificate Number 351926, Filed 27/07/70, Published 11/12/72  
(Translated from Referativnyy Zhurnal Metallurgiya, No 8, 1973, Abstract No  
8G176P, by G. Svodtseva).

Translation: A method of removal of the lining of an aluminum electrolyzer including breakup of the lining, differing in that in order to reduce the time required for overhaul of the electrolyzer and increase the productivity of the labor, the lining is broken up by lifting it upward in the loops of lines which are preliminarily placed on the layer of refractory filler between the cathode shell and the lining as it is installed. The ends of the lines are placed between the side plate and shell of the bath in the filler 1/4-1/3 of the way down from the top of the cathode shell. A cross-sectional drawing of an electrolyzer is presented.

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USSR

UDC 669.71.472(088.8)

ALESHINTSEV, V. I., BELOV, Yu. I., and SOBL', I. I.

"Electrolyzer for the Production of Aluminum"

USSR Author's Certificate No 271026, Filed 27/02/67, Published 27/08/70  
(Translated from Referativnyy Zhurnal-Metallurgiya, No 2, 1971, Abstract  
No 2 G147 P)

Translation: In order to increase the service life of the electrolyzer and increase the yield of Al per current, carbon-graphite blocks are located in steps, electrically insulated from each other, from the side lining and bottom blocks.

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USSR

UDC 669.713.7

KARNAUKHOV, YE. N., GUL'DIN, I. T., SOBOL', I. I., and USHAKOV, D. I.

"On the Selection of Optimum Electrolyte Composition for Aluminum Production"

Moscow, Tsvetnaya Metally, No 1, Jan 74, pp 35-38

Abstract: The most effective way of intensifying the production of aluminum is to change the electrolyte composition by introducing different salt additions. The electrolyte guaranteeing the lowest temperature of the process is considered optimum, as its temperature in the final analysis determines the current efficiency as well as the yield of energy and the efficiency of the electrolyzer. Factors which determine the overheating of the electrolyte and, therefore, the temperature of the process, are discussed and ways to decrease the ohmic resistance on the anode-metal section are indicated. A readily fusible electrolyte with raised electroconductivity and fluidity must be used to decrease the temperature of the process. The most effective addition is LiF; all other additions affect the properties of the cryolite-alumina melt in very different ways. The selection of optimum compositions of the multicomponent electrolyte for aluminum production must be based on experimental studies of the physico-chemical properties of melts and their industrial tests.

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KARNAUKHOV, YE. N., et al., Tsvetnyye Metally, No 1, Jan 74, pp 35-38

Chlorides of alkaline earth metals have the greatest effect on electroconductivity, viscosity, and fusibility of the melt. The quantity of additions of the multicomponent electrolyte must not exceed 8-10%. Eight bibliographic references.

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UDC 669.71.472(088.8)

BELOV, Yu. I., VOROB'YEV, D. N., SOBOL', I. I., AYUSHIN, B. I., and  
ZYRYANOV, L. P.

"Method of Utilizing the Spent Carbon-Material Lining of Aluminum Electro-  
lyzers"

USSR Author's Certificate No 261701, Filed 30/10/68, Published 28/08/70  
(Translated from Referativnyy Zhurnal-Metallurgiya, No 2, 1971, Abstract  
No 2 G158 P)

Translation: To reduce the cost of production of Al, the used lining made  
of carbon materials is ground to a grain size of 0.2 mm, then used to make  
up 2-5% of the dry charge used to make the anode mass.

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Optimization

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USSR

UDC 518.1

ARTOBOLVSKIY, I. I., Academician, GENKIN, M. D., GRINKEVICH, V. K., SOPOL', I. M., and STATNIKOV, R. B., State Scientific Research Institute of Mechanical Engineering, Moscow

"Optimization in Machine Theory by LP-Search"

Moscow, Doklady Akademii Nauk SSSR, Vol 200, No 6, 1971, pp 1287-1290

Abstract: The principal types of optimization problems occurring in machine theory are optimal analysis problems, optimal synthesis problems, and best approximation problems. They are all multiparametric and the use of classical methods of the calculus of variations is, as a rule, impossible. A global search is necessary. An "independent" random search (Monte Carlo method) permits the simultaneous optimization of all criteria that are of interest. The selection of the decision or compromise criterion can be made during the "man-machine" dialogue. Further improvement of the model (if it is required) is possible by using local search methods, which usually converge in the neighborhood of the extremum. The authors suggest that, instead of a random search, its deterministic analog -- an LP-search -- be used. It has led to much

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ARTOBOLEVSKIY, I. I., et al., Doklady Akademii Nauk SSSR, Vol 200, No 6, 1971, pp 1287-1290

better results than the random search in a number of complex problems, with the number of samples reduced 2-4 times. The article describes the scheme for the LP-search and considers the example of an oscillatory system with three degrees of freedom, in which it is necessary to find the model with the minimum length and the model with the maximum difference between the first and second natural frequencies subject to restrictions.

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SOBOL', I. M.

SPRS 54729  
17 Dec 71

UDC 518.1  
OPTIMIZATION IN THE THEORY OF MACHINES, USING THE LP-SEARCH METHOD

Article by Academician I. M. Sobol', 70, 74-78  
V. K. Grigalich, I. M. Sobol', I. Arkholyevskiy, M. D. Gerkhin, Scientific Research Institute of Machine Control, State Leningrad Academy of Sciences, and E. E. Stankov, State Leningrad Academy of Sciences, Vol 200, No 6, 1971, pp 1267-1297

The problems of optimum planning are particularly pressing under series production conditions and in the designing of expensive experiments.

Optimum planning includes both a search for a design plan (and its corresponding parameters) according to the given plan criteria and the creation of new mathematical methods that consider the specifics of complex multiparametric and multi-criteria problems [1].

I. Instead of the concepts machine, mechanism, design, and so forth, we will introduce a nondimensional analog model. For a given kinematic structure and  $n$  degrees of freedom, the model is determined by the point  $\alpha = (\alpha_1, \dots, \alpha_n)$  of the  $n$ -dimensional parallelepiped  $G$  in  $E^n$ .

where  $\alpha_i \in N_i$ ,  $N_i = \{0, 1\}$ ,  $i = 1, \dots, n$ . (1)  
The model's parameters are the limits of the permissible variations of the system's behavior isolating some closed section  $G$  in parallelepiped (1); we consider  $G$ 's volume to be positive.

If the quality of the model is determined by a function  $\phi(\alpha)$  (the quality criterion), which is defined in  $G$ , then we call that model  $\alpha^*$ , such that  $\phi(\alpha^*) = \max_{\alpha \in G} \phi(\alpha)$ , an optimum model.

Let us agree to write  $\phi^*(G)$ , if  $\phi(\alpha)$  is defined in  $G$ . Let us examine the basic types of optimization problems that arise in the theory of machines.

Machine Control

USSR

SOBOL' I. M.

"The Problem of Relating Dispersions with Norms"

Vopr. Vychisl. i Prikl. Mat. [Problems of Computational and Applied Mathematics -- Collection of Works], No 14, Tashkent, 1972, pp 12-14 (Translated from Referativnyy Zhurnal, Kibernetika, No 3, Moscow, 1973, Abstract No 3 V197 by B. Granovskiy).

Translation: In calculating the integral  $I(f) = \int_{\mathcal{X}} f(x) dx$  by the Monte

Carlo method, various quadrature formulas with random nodes are used, representing unbiased estimates for  $I(f)$ . The quality of these formulas is generally determined by the magnitude of their dispersion, which is

a certain functional in the class of functions  $L_1 = \{f: \int_{\mathcal{X}} f^2(x) dx < \infty\}$

The author sets himself the task of estimating the dispersion of quadrature formulas with random nodes in normalized functional spaces narrower than  $L_2$ . A solution to this problem produced earlier by the author for the simple Monte Carlo method and one normalized space of functions is presented.

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USSR

UDC 621.396.963

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SOBOL', I. S., Candidate of Medical Sciences, Col Med Serv

"Radiation Protection During Calibration of Dosimeters"

Moscow, Voenno-Meditsinskiy Zhurnal, No 3, 1970, pp 58-59

Abstract: A system is described for the radiation protection of personnel in repair and calibration operations. The system consists of the GUP-Co-5-1 industrial gamma-ray apparatus (flaw detector), in which manual control is replaced by remote control using the AOL-22 type 0.3-kw electric motor. The gamma-ray apparatus is mounted in the operational area between solid 0.8 m brick walls, which screen the radiation. The container for permanent storage of the source -- cobalt 60 with an activity of 640 milligram-equivalents of radium, the electric motor, and the RV-45 reducer, are mounted one meter below floor level in a one-story building.

The radiation source is raised via a flexible feed hose into the working container, which has a window in the upper part through which the gamma-rays pass and irradiate the dosimeter being checked. The dosimeter is delivered to the source in a carrier via a conveyor passing through an opening in the brick wall. An epidiascope, installed above the carrier containing the dosimeter, transmits  
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SOBOL', I. S., Voenno-Meditsinskiy Zhurnal, No 3, 1970, pp 58-59

scale readings of the meter being checked to a screen above the working place of the calibration specialist. The distance between the source and meter is measured with a centimeter tape, the readings of which are also transmitted by the epidiascope to the screen. Feed of the source into the working container and movement of the carrier and meter along the conveyor, to and from the specialist and source, is accomplished by a remote control panel operated by the specialist. Knowing the activity of the source and its distance to the calibrated instrument, it is easy to check the correlation between the radiation dose rate of the source and the instrument readings.

The reliability and high degree of radiation protection afforded by this system have been confirmed by six years' study of work in radiation calibration, and were determined by measurements of radiation levels in the working place and in the adjacent room by individual dosimetry, and by dynamic observations of the state of health of people working in the radiation calibration shops.

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UNCLASSIFIED

PROCESSING DATE--23OCT70

TITLE--EVALUATION OF THE PROPERTIES OF CAST IRON BY CHEMICAL AND THERMOGRAPHIC ANALYSES -U-  
AUTHOR--(04)-LEVI, L.I., KLETSKIN, G.I., SOBOL, N.L., KITAYEV, YA.A.

COUNTRY OF INFO--USSR

SOURCE--LITEINOE PROZIVED. 1970, 2, 7-8

DATE PUBLISHED-----70

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SUBJECT AREAS--MATERIALS

TOPIC TAGS--CAST IRON, ALLOY COMPOSITION, MECHANICAL PROPERTY, THERMOGRAPHIC ANALYSIS

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1996/1733

STEP NO--UR/0128/70/002/000/0007/0008

CIRC ACCESSION NO--AP0118711

UNCLASSIFIED

2/2 012

UNCLASSIFIED

PROCESSING DATE--23OCT70

CIRC ACCESSION NO--AP0118711

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE TEMP. INTERVAL OF SOLIDIFICATION CAN BE DETD. RAPIDLY IN 1-5 MIN BY A THERMOGRAPHICAL METHOD AND FOR STABLE CONDITIONS IT CAN BE USED FOR THE EVALUATION OF MECH. PROPERTIES OF CAST IRONS. THE RELIABILITY OF THIS PROCEDURE WAS VERIFIED WITH 3 KINDS OF CAST IRONS A, B, AND C. (C 2.84-3.31, 3.07-3.34, 3.15-3.40; SI 1.21-2.84, 1.31-1.84, 1.80-2.30; AND MN 0.08-1.72, 0.80-1.63, 0.60-1.10 WT. PERCENT, RESP.) REGRESSION EQUATIONS WERE DETD. FOR TENSILE STRENGTH AND HARDNESS IN DEPENDENCE ON THE TEMP. INTERVAL OF CRYSTN. FROM THERMOGRAPHICAL ANALYSES. SIMILAR EQUATIONS WERE DETD. FOR TENSILE STRENGTH AND HARDNESS IN DEPENDENCE ON THE CONC. OF SI AND C FROM CHEM. ANALYSES. BOTH THERMOGRAPHICAL AND CHEM. METHODS GAVE ANALOGDUS CORRELATION COEFFS. FOR EACH OF THE 3 CAST IRONS, THE BEST COEFF. WAS OBTAINED FOR THE CAST IRON WHICH HAD THE MOST STABLE CHEM. COMPN. OF CHARGING MATERIALS.

UNCLASSIFIED

1/2 029 UNCLASSIFIED PROCESSING DATE--11SEP70  
TITLE--EVALUATION OF THE PROPERTIES OF CAST IRON BASED ON CHILL TESTS -U.  
AUTHOR--LEVI, L.I., KLETSKIN, G.I., SOBOL, N.L., KITAYEV, YA.A.  
COUNTRY OF INFO--USSR  
SOURCE--LITEINOE PROIZVOD. 1970, (1), 6-7  
DATE PUBLISHED-----70  
SUBJECT AREAS--MATERIALS  
TOPIC TAGS--CAST IRON, SILICON, METALLURGIC PROCESS CONTROL, TENSILE  
STRENGTH, METAL HARDNESS  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1988/1318 STEP NO--UR/0128/70/000/001/0006/0007  
CIRC ACCESSION NO--AP0106095  
UNCLASSIFIED

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PROCESSING DATE--11SEP70

CIRC ACCESSION NO--AP0106095

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. ON THE BASIS OF INDUSTRIAL CONTROL DATA AN ATTEMPT WAS MADE TO CORRELATE TENSILE STRENGTH AND HARDNESS VALUES WITH RESULTS OF THE CHILL TEST FOR 2 GRADES OF GRAY CAST IRON MELTED IN AN 11 TON COKE GAS CUPOLA WITH PREHEATED BLAST (C 2.84-3.31, 3.07-3.34; SI 1.21-2.84, 1.31-1.84; MN 0.80-1.72, 0.90-1.63; P 0.25, 0.25, S 0.11, 0.11 WT. PERCENT, RESP.). THE 1ST CAST IRON WAS MODIFIED WITH CA 0.4-1.1PERCENT, WHILE THE 2ND WAS UNMODIFIED. STUDIED CAST IRONS WERE CAST INTO DRY MOLOS DIAM. 30, LENGTH 340 MM, AS WELL AS IN CHILL TEST MOLDS, REPRESENTING PLATES 50 TIMES 20 AND 50 TIMES 8, RESP., IN WHICH THE ONE SIDE WAS COOLED BY A MASSIVE METAL BLOCK. REGRESSION EQUATIONS WERE CALCD. FOR THE TENSILE STRENGTH AND HARDNESS DETNS.; THESE DID NOT SHOW ANY SIGNIFICANT CORRELATION. THE REASON FOR THIS WAS THAT SI CONCN. AFFECTED THE FORMATION OF CEMENTITE LAYER 5-7 TIMES MORE STRONGLY THAN IT AFFECTED THE TENSILE STRENGTH AND HARDNESS.

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UNCLASSIFIED

PROCESSING DATE--09OCT70

TITLE--SOLUTION OF THE AIR EXCHANGE PROBLEM IN THE WORKING CHAMBERS OF  
LARGE IRRADIATION PLANTS -U-

AUTHOR--SOBOL, N.V.

COUNTRY OF INFO--USSR

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SOURCE--BERLIN, KERNENERGIE, VOL 13, NO 2, FEB 1970, PP 55-57

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CIRC ACCESSION NO--AP0113551

UNCLASSIFIED

2/2 016

CIRC ACCESSION NO--AP0113551

UNCLASSIFIED

PROCESSING DATE--09OCT70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A TECHNIQUE FOR CALCULATING THE AIR EXCHANGE IN THE WORKING CHAMBERS OF LARGE IRRADIATION PLANTS (GAMMA IRRADIATION RIGS AND ELECTRON ACCELERATORS) IS PROPOSED, BASED ON TAKING INTO ACCOUNT THE DANGEROUSNESS OF THE VARIOUS DAMAGES DUE TO RADIATION EFFECTS IN AIR. THE 'FORBIDDEN PERIOD' IS CALCULATED. FACILITY: INSTITUTE FOR OCCUPATIONAL HEALTH, SOVIET ACADEMY OF SCIENCES. FACILITY: INSTITUT GIGIENI TRUDA I PROFZABOLEVANII AMN SSSR.

UNCLASSIFIED

89

Superalloys

USSR

UDC 669.243.82

SOBOL', S. I.

"Secondary Losses of Nickel and Cobalt in Autoclave Leaching of Oxidized Nickel Ores"

Moscow, Tsvetnyye metally, No 5, May 72, pp 25-28

Abstract: Selective autoclave leaching of nickel and cobalt ores with sulfuric acid is the basis of the processing flow chart at the Moa Plant (Cuba). Studies conducted at the State Scientific Research Institute of Nonferrous Metals [GINTSVETMET] indicate that losses of nickel and cobalt with leaching waste are dual in nature, i.e., there are primary (incompletely leached) and secondary--due to the formation of aluminum sulfate hydrolysis products. The latter occur in the form of minerals including hematite  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>, boehmite  $\gamma$ -Al(OH)<sub>3</sub>, aluminum chromite, hydronium alunite, and others. Extensive experimentation both at GINTSVETMET and at the Moa Plant on controlling the chromate ion contents in the leaching solution and reducing Ni and Co losses point to the formation of hydronium alunite (H<sub>3</sub>O)Al<sub>3</sub>(SO<sub>4</sub>)<sub>2</sub>(OH)<sub>6</sub>, a complex hydrolysis product, as the cause of the secondary losses of Ni and Co. (2 illustrations, 3 bibliographic references)

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USSR

UDC 629.78:621.396

SOBOL', V. E., MOS'PAN, P. I.

"The Influence of Vibration on the Phase of the Output Signal of an On-board Transceiver with APC"

Samoletostr. i Tekhn. Vozd. Flota. Resp. Mezhved. Temat. Nauch.-Tekhn. sb. [Aircraft Building and Air Force Technology, Republic Interdepartmental Thematic Scientific and Technical Collection], No 26, 1971, pp 26-29, (Translated from Referativnyy Zhurnal, Raketostroyeniye, No 4, 1972, Abstract No 4.41.238 by T. A. Ye.).

Translation: One factor significantly reducing the accuracy of measurement of the trajectory parameters of flight vehicles with Doppler systems is the influence of vibrations on the phase of the output signal of the on-board transceiver. This article demonstrates that in actual on-board transmitters, the influence of vibration on output signal phase can be eliminated by using automatic phase control. 4 Figures; 3 Biblio. Refs.

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USSR

UDC 621.43.052.001.5

~~SOBOL', V. N.~~, ZEL'DES, N. L., Candidates of Technical Sciences, POGREBNIYAK, V. V., and SKAZHENIK, A. M., Engineers

"Strong Supercharging of the 10D100 Engine by Gas Turbine Compressor"

Leningrad, Energomashinostroyeniye, No 7, July 72, pp 17-18

Abstract: An analysis is presented of modifications and improvements to a gas turbine compressor TK-34, intended to increase its efficiency in a forced regime up to the value of pressure rise ratio  $\pi = 2.1$ . The theoretical results were substantiated by tests conducted on modified serial TK-34 turbo-compressors. They show that a reduction is obtained in specific effective fuel consumption.

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USSR

UDC 669-172:541.12.036

PELETSKIY, V. E., DRUZHININ, V. P., and SOBOL', Ya. G.

"Thermophysical Properties of Monocrystalline Molybdenum in the High-Temperature Area"

Monokristally Tugoplavkikh i Redkikh Metallov [Single Crystals of Refractory and Rare Metals -- Collection of Works], Nauka Press, 1971, pp 85-89

Translation: The heat conductivity coefficient, specific electrical resistivity, and intergral hemispherical degree of blackness of monocrystalline molybdenum are studied. The measurements were performed in the 1,000-2,200°K interval on specimens with various crystallographic orientations of growth axes. Measurements of the degree of blackness were performed both on cylindrical and on flat specimens with predetermined surface orientation. The results show good correspondence with the data for polycrystals of the same degree of purity, and confirm the isotropic nature of these properties of single crystals with cubic lattices. 2 Tables; 2 Figures; 6 Bibliographic References.

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Magnetohydrodynamics

USSR

IVANOV, A. A., KOZOROVITSKIY, L. L., RUSANOV, V. D., SAGDEYEV, R. Z., and SOBOLENKO, D. N.

"Experimental Observation of Electron Shock Waves in a Collisionless Plasma"

Moscow, Pis'ma v Zhurnal Eksperimental'nov i Teoreticheskoy Fiziki, Vol 14, No 11, 5 Dec 71, pp 593-596

Abstract: Experimental proofs of the existence of a stationary heat discontinuity (an electron shock wave) in a collisionless plasma are discussed and its parameters are interpreted in accordance with the theory. The structure of a thermal wave front that was obtained with an internal diamagnetic probe introduced into the chamber in hydrogen and argon discharges is shown. The initial plasma was produced by two high-frequency generators inside a glass tube of diameter 8 cm and length  $\sim 250$  cm in a longitudinal homogeneous magnetic field of the order of 0.5-5 kga. The initial gas pressure varied in the range  $4 \cdot 10^{-4}$  torr and the charge particle concentration was  $2 \cdot 10^{13}$   $\text{cm}^{-3}$ , while the initial electron temperature was 10 ev. Local plasma heating up to electron temperatures of  $\sim 300$  ev was achieved with a narrow coil that generated a skew magnetosonic wave of large amplitude. The structure shows that there exists a region of values where a wave of the shock type with

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SSR

IVANOV, A. A., et al., Pis'ma v Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 14, No 11, 5 Dec 71, pp 593-596

a fairly steep pressure drop is formed. The velocity of this wave D depends on the mass of the gas ions and drops by approximately a factor of 2 upon changing to a discharge in argon. A similar wave structure was obtained with measurements with a specially designed double electric probe. Controlled experiments made on plasma afterglow with an electron temperature of 10.5 eV showed that the length of the front and the wave velocity hold constant--i.e., are independent of the initial temperature -- but that the detailed structure of the front varies somewhat. Analysis of the expression for the velocity of the thermal wave shows that velocity should be a function of the mass of the ions,  $\sqrt{1/M}$ . Experiments with a xenon plasma showed that the wave velocity also decreases in accordance with this relationship. The width of the thermal wave front is found by taking into account the fact that the current velocity of cold electrons is dependent on the potential produced by hot electrons. A method for determining the density profile of the hot electrons is indicated. The authors claim that the analysis proves that a stationary electron shock wave exists in a collisionless plasma and note that such a shock wave can arise also in other situations, such as in the effective attenuation of a relativistic high-current beam in a plasma.

USSR

UDC 621.791.06:669.15-194

TESLENKO, T. S., SOBOLENKO, T. M., and BERDICHEBSKIY, G. V., Institute of Hydrodynamics of the Siberian Department of the Academy of Sciences USSR

"The Structure of Steel Joints Produced by Explosive Welding"

Kiev, Avtomaticheskaya Svarka, No 1, Jan 72, pp 1-4

Abstract: A study was made of the composition and structure of the zone of steel joints produced by explosive welding, the distribution of alloying elements in the seam zone, and their behavior under heat treatment. Investigated were the following material pairs: 1Kh18N9 steel and 1Kh18N9 steel, St. 3 steel and nickel, St.3 steel and 1Kh18N9T, 1Kh18N9T steel and G13L steel, and 1Kh18N9T steel and U8 steel. The parameters of the inter-diffusion of the welded materials and the transition zones are analyzed on the basis of their micropictures and concentration curves immediately after welding and after annealing in vacuum for 4 hrs at 650, 850, and 1200°C. Five illustrations, nine bibliographic references.

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USSR

UDC 621.771.23:621.892.6

MONID, A. G., GRENBERG, D. L., SOROLEYKO, V. P., YIRSOV, P. A., and ROBOYKIN, I. A., Cherepovets Metallurgical Plant; Vologda State Pedagogical Institute

"Anticorrosion Protection of Steel Sheets"

Moscow, Metallurg, No 9, Sep 70, pp 33-34

Abstract: A study was made of the effectiveness of the anticorrosion protection of sheet steel using inhibitor oils. The study was prompted by the multitude of complaints lodged by consumers and plants. The latter have been shipped both cold- and hot-rolled steel sheets with corrosion defects. The project called for the development of an anticorrosion protection for hot-rolled, cold-rolled, and galvanized steel using inhibitor oils. Industrial oil-20 was mixed with NG-203 and NG-204 and lubricants PP95/5 in concentrations of 10, 20, and 30%. Samples of 08 kp steel treated with oil containing additives of NG and PP95/5 inhibitors in concentrations of 10-30% passed 15 days of open-air testing. The treated metals were also subjected to accelerated tests which consisted of dipping in water for 8 hours at 40°C followed by holding in air for 20 hours. The cycle was repeated 5 times. Use was made of a point system to assess anticorrosion protection. The outcome of the study was a standardization of anticorrosion lubricants comprising oil-20 with additives of NG-203 and 204.

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USSR

MONID, A. G., et al, Metallurg, No 9, Sep 70, pp 33-34

inhibitors, construction of mixer equipment, and development of a coating technology.

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USSR

UDC 621.397:681.17

SOBOLEV, A. L.

"Television Recorder of Microparticles"

Moscow, Tekhnika Kino i Televideniya, No 7, Jul 72, pp 56-57

Abstract: A simple television recording method of the number and sizes of micro-particles of variable sections, e. g. circle, ellipse, and others, is discussed and a television recorder using the suggested method is described by reference to its block diagram. The point of the method lies in the fact that the separation of the informative signal from each particle, that is the required correlation in scanning of signals, takes place by means of comparison of the duration of signals from all intersections of particles with the signal only from a specific location of their intersection. With the use of an indicated registration algorithm, the suggested method makes it possible easily to obtain the differential as well as the integral rule for the distribution of particles by sizes. The block diagram and general view of the recorder are shown. Two illustr., four biblio. refs.

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USSR

UDC: 629.7.018:621.365.42

ISKRA, A. L., MALYSHEV, L. A., POPOV, V. Ye., SOBOLEV, A. A.

"A High-Temperature Ohmic Gas Heater"

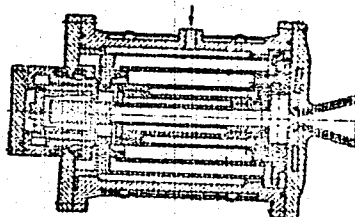
Moscow, Otkrytiya, Izobreneniya, Promyshlennyye Obratzys, Tovarnyye Znaki, No 10, Apr 73, Author's Certificate No 369449, Division G, H, filed 7 Apr 71, published 8 Feb 73, p 121

Translation: This Author's Certificate introduces a high-temperature gas heater, e. g. for a hypersonic wind tunnel. The device contains a housing with a gas feed system, heating elements of a porous current-conducting material, and a prechamber. The heating elements are made in the form of hollow split coaxial cylinders which form a labyrinth cavity between them. As a distinguishing feature of the patent, the range of operating conditions in the wind tunnel is extended by placing an interchangeable ceramic inset between the labyrinth cavity and prechamber of the heater. The inset has holes through it, and can be changed to vary the route of flow of the gas through the porous heating elements.

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USSR

ISKRA, A. L. et al., USSR Author's Certificate No 369449



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USSR

UDC 621.385.6

SCBOLEV, D.P., ZAZNOBIN, YE. S., PCDGORNOV, I.P.

"Measurements Of The 'Fins' Structure Of The Signal Of Power Microwave Devices"

Elektron. tekhnika. Nauchno-tekhn. sb. Elektron. SVCh (Electronics Technology. Scientific-Technical Collection. Microwave Electronics), 1970, No 2, pp 86-99 (from RZh--Elektronika i yeye primeneniye, No 8, August 1970, Abstract No 8A146)

Translation: A description is given of the measurement methods and the construction of units for measurement of: the spectrum of a signal of millisecond duration with a resolution of 30 Hz, the spectral density of the fluctuations in the 5 kHz--4.5 MHz frequency band being analyzed with a resolution of 200 Hz, the electrical phase shift, the phase-frequency characteristics and phase deformation in a pulse, and the short-lived instability of the frequency during a time interval of 10-30 milliseconds.

Summary.

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Acc. Nr.

AP0105560

Abstracting Service:  
CHEMICAL ABST.

670

Ref. Code

4P0363

127137s Electron paramagnetic resonance in lattice defects in synthetic diamonds. Bratashevskii, Yu. A.; Litvin, Yu. A.; Samsonenko, N. D.; ~~Sebeles, E. V.~~ (Donetsk. Fiz.-Tekh. Inst., Donetsk, USSR). *Izv. Akad. Nauk SSSR, Neorg. Mater.* 1970, 6(2), 368-9 (Russ). A new type of EPR spectra obtained in nonirradiated synthetic diamonds is discussed. In synthetic diamonds which had been synthesized with various amts. of solvents (Ni, Co, Mn, Fe, Cr) present, at  $<150^\circ$ , a spectrum is obsd. consisting of a central narrow isotropic line with one and the same  $g$ -factor, equal to 2.0324, and of 2 satellites with the very same  $g$ -factor and a distance between them of 2.7 Oe. The intensity of the spectrum significantly increases for those diamonds, which have probably been grown at a higher rate. A similar spectrum has not been obsd. in nonirradiated natural diamonds. These facts make one assume that this spectrum is caused by lattice defects arising during growth of these crystals. The most probable defect can be interstitial C atoms, the concn. of which can increase with increasing growth rate of the diamonds. The presence of the 2 satellite lines can be assocd. with the hyperfine interaction between electrons with unpaired spins. There is absence of anisotropy in the  $g$ -factor because the deformation of the surrounding cell by virtue of the Jahn-Teller

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effect is of a dynamic nature; it proceeds at a rate which is significantly higher than the spin relaxation rate, as a result of which a slight averaging of the  $g$ -factor is obsd. exptl.

S. A. Mersol

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USSR

UDC 535.854

MIROVITSKIY, D. I., SAMSONOV, G. A., SOBOLEV, G. A., and SHANIN, V. I.,  
Moscow Institute of Radiotechnology, Electronics and Automation

"A Device for Processing the Optical Signals Scattered from Objects"

USSR Author's Certificate No 366444, Filed 22 Jan 71, Published 16 Jan 73  
(from Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 7,  
Mar (a) 73, Claim No 1617320/26-9)

Translation: A device for the processing of optical signals scattered from objects, containing a source of coherent radiation, an axial optical canal, consisting of a collimator, a phototransparency, a Dove prism and a lens for direct and reverse Fourier conversions with an adjustable filter mounted between them and a canal for formation of optical signals scattered from objects in a hologram, in series, distinguished by the fact that in order to increase the rapidity of signal processing in the basic optical canal a translucent mirror a lens, a hologram and a rotating mirror have also been placed in series, optically connecting the output of the collimator with the adjustable filter, while the hologram and the adjustable filter are recorded on a registering device, for example a thermoplastic.

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USSR

UDC: 621.385:530.145.6:62

SOBOLEV, G. A.

"A Method of Machining Materials"

USSR Author's Certificate No 256122, filed 18 Jun 66, published 3 Apr 70 (from RZh-Radiotekhnika, No 10, Oct 70, Abstract No 10D501 P)

Translation: This Author's Certificate introduces a method of machining materials by laser emission, using a hologram to form the image. As a distinguishing feature of the patent, machining effectiveness is improved by placing the hologram or a metal copy inside the resonator.

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USSR

UDC 621.385.64.072.9:621.391.822.5

SOBOLEV, G.L., VOL'FSON, A.O., IL'IN, V.K.

"Fluctuations In Synchronized And Stabilized Voltage-Tuned Magnetrons"

Radiotekhnika i elektronika, Vol XVII, No 5, May 72, pp 1039-1045

Abstract: Analytical expressions are found for the spectrum of the output oscillations of a voltage-tuned magnetron (VTM) which is synchronized by an external signal and stabilized by a high-Q resonator. The relationships obtained in the work make it possible to calculate the spectra of the fluctuations of the amplitude and phase and the spectrum of the high-frequency oscillation of a VTM for regimes of synchronization and stabilization with the existence of shot noise. The spectra of the fluctuations for a stabilized VTM implies the possibility of reducing noise in all regions of the spectrum of the output oscillations of a VTM. 2 fig. 12 ref. Received by editors, 8 April 1971.

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USSR

UDC: 621.385.6:001.2

SOBOLEV, G. L., BOCHKAREV, V. V.

"Analysis of the Working Characteristics of an Amplitron in the Nonlinear Dynamic Mode. Part 1. Unlimited Cathode Current"

Elektron. tekhnika. Nauch.-tekhn. sb. Elektron. SVCh (Electronic Technology. Scientific and Technical Collection. SHF Electronics), 1971, vyp. 2, pp 80-87 (from RZh-Elektronika i yeye Primeneniye, No 6, Jun 71, Abstract No 6A147)

Translation: The authors calculate the basic characteristics of an Amplitron in the nonlinear dynamic mode. The calculation was based on using averaged trajectories of electrons with regard to space-charge fields. It is shown that the effect of the space charge leads to a shift of the band characteristic of the Amplitron toward lower frequencies and cuts off amplification at certain plate voltages. Conditions are determined under which the electronic phase shift is a minimum. Bibliography of ten titles. Resumé.

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USSR

UDC: 621.385.644.2

SOBOLEV, G. L., SOLINTSEVA, V. B., editorial staff of "Radiotekhnika i elektronika", Academy of Sciences of the USSR

"Frequency Response Analysis of a Multicavity Magnetron"

Analiz chastotnykh kharakteristik mnogorezonatornogo magnetrona (cf. English above), Moscow, 1971, 16 pp, ill., bibliography of six titles (2642-71 Dep.) (from RZh-Elektronika i yeye primeneniye, No 6, Jun 71, Abstract No 5A144 DEP)

Translation: Electronic frequency displacement and voltage retuning of the frequency are observed in a multicavity magnetron. In the voltage retuning mode, the frequency is a nearly linear function of constant potential, and in accordance with Welch's theory this is determined by low rf potentials. Experiments by Wilbur and Peters show that the rf potentials accompanying voltage retuning are not necessarily small. Bogolyubov's asymptotic method is used for approximate calculation of the trajectories of motion of electrons with regard to the space charge in a cylindrical type 4/50 magnetron; the method of Green's functions is used. The active and reactive components

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SOBOLEV, G. L., SOLNTSEVA, V. B., Analiz chastotnykh kharakteristik mnogo-rezonatornogo magnetrona, Moscow, 1971

of the power of interaction are calculated as well as the emission frequency. The computational cycle was repeated after finding the rf potential. The results of the analysis are as follows. At constant potentials of 21-22.4 kV and rf potentials  $U_1 = 14.1-23.2$  kV,  $B = 0.69$  Wb/cm<sup>2</sup> under conditions of unlimited emission temperature, the current and power increase in satisfactory correspondence with experiment. A change in constant potential from 22.4 kV to 25 kV while limiting the density of the space charge causes a slight change in direct current and power, and a nearly linear increase in frequency. Frequency tuning is 30 MHz when  $U_1 = 23$  kV,  $Q_1 = 222$ . Thus voltage retuning takes place at high rf potentials and comparatively high Q. Bibliography of six titles. Authors' abstract.

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Television

USSR

UDC: 621.397(204)

YASTREBOV, V. S., SOBOLEV, G. P., MAKHROV, V. P.

"Some Problems of Using Television Systems on Underwater Remote-Controlled Equipment"

Nekotoryye voprosy ispol'zovaniya televizionnykh sistem na podvodnykh distantcionno-upravlyayemykh apparatakh. In-t okeanol. AN SSSR (cf. English above. Institute of Oceanology of the Academy of Sciences of the USSR), Moscow, 1970, 14 pp, bibliography of two titles (No 2036-70 Dep.) (from RZh-Radiotekhnika, No 12, Dec 70, Abstract No 12G227 DEP)

Translation: The authors present the characteristics of TV systems for underwater equipment and their elements. Some considerations are given on selecting the parameters of a TV system. Recommendations are given on preferable design of elements based on experimental studies. Authors' abstract.

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SOBOLEV, I.A.

DISPOSAL OF RADIOACTIVE WASTES  
Collection of papers sponsored by the State Committee for the  
Use of Atomic Energy of the USSR, 1972, Moscow

JPRS 58764  
17 April 1973

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[I - USSR - K]

STUDY OF THE POSSIBILITY OF USING BITUMINATION FOR PROCESSING HIGHLY ACTIVE WASTES

Article by K. P. Zahharova, V. V. Kulechenko, Yu. P. Markin, I. A. Sobolev, and L. M. Khomchik, State Committee for the Use of Atomic Energy of the USSR, IAEA Publication ST-163 (1972), Moscow, 1972, Russian pp 1-24

At the present time the problem of the possibility of increasing the permissible specific activity of wastes enclosed in bitumen is being raised more and more frequently.

Now already there is no doubt of the possibility of bitumination of wastes with a specific activity of up to 1 curie per liter. At the same time, 100 curies per liter in bitumen [7].

The limiting value of the specific activity is determined by two factors: fraction of the heat accumulated in the blocks and the possible ex-active decay.

1. Radiation-chemical stability of bitumen

An essential factor determining the conditions of the burial of blocks is a possible liberation of gaseous products of radiolysis.

For 5 years observations have been made of the change in the pressure in metals with bitumen blocks containing 60% bitumen BP-III (oxidized) and 40% sodium nitrate, and having a specific activity from 0.15 to 15.4 curies per liter with respect to strontium-90 (figure 1). The liberation of gaseous products of radiolysis was observed in all the experiments after a prolonged period of the process of gas absorption, accompanied by a pro-longed period of the process of gas absorption, accompanied by a decrease in the pressure in the metal. For a block with an activity of 0.15 curie

per liter already after two years of storage the rate of gas liberation increases insignificantly and the pressure in the vessel does not increase, in practice. For specimens with a specific activity of 1.54 and 15.4 curies per kilogram gas liberation is still observed, but, however, its rate begins to decrease, and the tendency toward a retardation is greater in a specimen with a specific activity of 15.4 curies per kilogram. The beginning of noticeable gas liberation and an increase in pressure in a tank for blocks earlier than for blocks of a specific activity of 15.4 curies per kilogram with a specific activity of 1.5 curies per kilogram is noticeable considerably earlier than for blocks of a specific activity of 15.4 curies per kilogram. At the present time, specimens have been prepared with a specific activity of 55 and 52 curies per kilogram with respect to strontium-90 on the basis of bitumen BII-III (90% BII-III + 10% NaNO<sub>3</sub>). The volume of the specimen was 83 cubic centimeters (weight 100 grams, free volume in the bubble cubic centimeters). During the first forty days gas absorption in the specimens was observed (Figure 2), after which gas liberation began. After 150 days the pressure somewhat exceeded the pressure in the tank.

For pure bitumen BII-III and two specimens based on it, irradiated in a Co-60 installation with a power of the dose of  $2.1 \times 10^5$  rad per hour, the composition of the gaseous phase formed as a result of radiolysis was determined (Table 1).

A comparison of these results with some obtained earlier (2) with a dose of absorbed energy of  $7 \times 10^6$  rad and a power of the dose of  $2.9 \times 10^4$  rad per hour demonstrated that the increase in the power of the dose and the appearance of methane, hydrocarbons of group C<sub>2</sub> and carbon dioxide in the gaseous phase.

Simultaneously in all cases a decrease in the oxygen content in the gaseous phase, in comparison with the air ratio, was noted. The presence of sulfuric nitrate in the specimen in the given case has no essential effect on the composition of the gaseous phase.

For determination of the nature of radiation changes in the bitumen and in bitumen preparations special investigations were conducted.

Specimens in the form of cylinders, the diameter and height of which amounted to 3.5--4 centimeters, were irradiated with a Co-60 installation with various powers of the dose, and in this case the total dose of absorbed energy was preserved practically constant. The irradiation was conducted in an atmosphere of air.

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USSR

UDC 678.06-419.8:677.521.01:53

KIRILLOV, V. N., SOBOLEV, I. V., YEFIMOV, V. A., and GARANINA, S. D.

"Thermophysical Properties of Fiberglass With Silicon Filler"

Moscow, Plasticheskiye Massy, No 2, 1973, pp 54-57

Abstract: The effect of thermal treatment for silicon fiber on its properties and the thermophysical properties of the fiberglass based on a silicon filler and various binders was studied. The silicon fiber KT-11 was treated at 300, 600 and 800°C. Fiberglass materials were prepared from phenylfurfuryl, phenylformaldehyde, organosilicon, and modified epoxy binders. Experimental results show that with increased temperature of the fiber treatment the amount of moisture on the surface of fibers is sharply decreased. In fiberglass materials with large interconnected pores the moisture loss occur in all layers of the filler; in fiberglass of low porosity these processes occur only on the surface layers. Thus during the thermal treatment of silicon fiber its properties are altered in line with its structural changes. Thermophysical properties of fiberglass filled with silicon fiber KT-11 depend to a large degree on the treatment temperature of the filler.

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Automatic Control: Systems

USSR

UDC 262-5:62-19

PETLENKO, B. I., Candidate of Technical Sciences, and SOBOLEV, I. K., Engineer

"Determination of Optimal Reliability of Redundant Control System"

Moscow, Mekhanizatsiya i Avtomatizatsiya Proizvodstva, No 11, 1971, pp 33-34

Abstract: Let a control system consist of  $i$ -th functional data transmission and processing elements, the number of which is  $N$ , and let them all be connected in series. Each of the  $i$ -th elements has a cost  $c_i$  and a failure rate  $\lambda_i$ , the  $j$ -th communications in the control loop circulating at a mean frequency of  $f_j$  and the flow of communications and failures being governed by Poisson's law. The reliability of each  $i$ -th element can be raised through unloaded redundancy, most often used in practice, with the working element being duplicated by  $(n_i - 1)$  nonoperating standby elements. It is assumed that failure detection and the switch to a standby element occurs instantaneously with a probability equal to unity, and each failed element is

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USSR

PETLENKO, B. I., and SOBOLEV, L. K., Mekhanizatsiya i Avtomatizatsiya  
Proizvodstva, No 11, 1971, pp 33-34

restored in the course of a mean time  $\bar{T}_i$ , distributed according to exponential law. The problem is to find a probability of system survival  $P_0$ , as well as a redundancy rate for the  $i$ -th elements such that the annual economic effect from introduction of the system is maximal. In estimating system optimality, allowance is made for capital expenditures on the system and operating costs, as well as losses resulting from unreliability of the system. The control system for an automatic drilling rig is considered as an example.

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USSR

SOBOLEV, N. A.

UDC: 621.391.8:519.27

"Signal Spectra Describable by Legendre and Chebyshev Polynomials"

Sb. tr. Nauchno-tekhn. konferentsii prof.-prapodavat. sostava Vses. zacchn. elektrotekhn. in-ta svyazi (Collected Transactions of the Scientific-Technical Conference of Professorial-Instructor Staff of the All-Union Correspondence Electrical Engineering Institute of Communication) No. 5, Moscow, 1970, pp 51-61 (from RZh-Radiotekhnika, No. 3, March 71, Abstract No. 3A109)

Translation: The application of a system of orthogonal functions for information transmission is considered. It is shown that the frequency spectral band that can be occupied by each orthogonal oscillation can be substantially narrowed if the polynomials of odd order are represented by polynomials of even order. The orthogonality condition is not thereby violated. Three illustrations, four tables, bibliography of two. V. Ch.

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USSR

UDC: 620.171

Sobolev, N. D., Merozov, Ye. M., Markochev, V. M., Gol'tsev, V. Yu., Sapunov, V. T.,  
Bobrinskiy, A. P., Moscow

"Experimental and Theoretical Study of the Rupture of Sheet Materials with Cracks"  
Kiev, Problemy Prochnosti, No 7, 1972, pp 45-49.

Abstract: Methods are presented for producing rupture diagrams during tensile testing of flat specimens with an initial crack. The results of testing of specimens of sheet material of various thicknesses of aluminum and titanium alloys, as well as certain steels, are studied.

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USSR

UDC: 621.375.82

MIKABERIDZE, A. A., OCHKIN, V. N., SOBOLEV, N. N.

"On the Population of Lower Laser Levels in a Carbon Dioxide Laser"

Moscow, Kvant. elektronika--sbornik (Quantum Electronics--collection of works), No 1(13), "Sov. radio", 1973, pp 41-46 (from RZh-Fizika, No 8, Aug 73, abstract No 8D1061 by the authors)

Translation: The vibrational temperatures of deformation vibrations of CO<sub>2</sub> molecules are measured by the method of rotating spectral lines in the 15-um region. Comparison of the resultant vibrational temperatures with the calculated gas temperatures shows that the population of the lower laser levels is equilibrium in nature. Parallel measurement of the vibrational temperatures for antisymmetric vibrations of CO<sub>2</sub> molecules enables determination of the absolute population of the laser levels and inversion. The results are compared with measurements by the method of laser signal amplification. Bibliography of 20 titles.

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USSR

SOBOLEV, N. N., SOKOVIKOV, V. V., TARANENKS, V. G.

UDC: 621.375.82

"Kinetic Model of the Formation of a Population Inversion in a Carbon Monoxide Gas-Discharge Laser"

Moscow, Kineticheskaya model' obrazovaniya inversii zaselennostey v gazo-razryadnom lazere na okisi ugleroda. Fiz. in-t AN SSSR. Lab. optiki nizko-temperatur. plazmy (cf. English above. Physics Institute of the Soviet Academy of Sciences. Laboratory of Low-Temperature Plasma Optics), Preprint No 34, 1973, 26 pp, ill., mimeo. (from RZh-Fizika, No 8, Aug 73, abstract No 8D1054 [résumé])

Translation: The populations of vibrational levels of CO are numerically calculated in the plasma of a CO-He laser. The system of kinetic equations describing processes of excitation and de-excitation of the vibrational levels of CO in the discharge is solved for different gas temperatures and pressures and different values of the parameter  $T_1^*$  characterizing pumping. The probabilities of vibrational transitions were calculated by the Hertzfeld formulas modified to account for anharmonicity of molecules. The resultant population distributions differ appreciably from Boltzmann distri-

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USSR

SOBOLEV, N. N. et al., Kineticheskaya model' obrazovaniya inversii zaselenostey v gazorazryadnom lazere na okisi ugleroda. Fiz. in-t AN SSSR. Lab. optiki nizkotemperat. plazmy, Preprint No 34, 1973

The initial sections of the distribution curves are approximately described by the Trenor formula and are weakly dependent on the probabilities of transitions. The further behavior of the curves is determined by the ratios between the rate constants of the processes involved in the system of equations. Plateaus formed on the curves i.e., sections with a high vibrational temperature are a consequence of accounting for anharmonicity of molecules. The theoretical and experimental data agree satisfactorily, confirming the validity of the model on which the computations are based.

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USSR

UDC: 621.375.82

LOTKOVA, E. N., IVANOV, M. N., SAVCHENKO, V. F., and SOBOLEV, N. N.  
"Radiation Generation in the Five-Micron Region With a CO<sub>2</sub>+N<sub>2</sub>+He  
Mixture"

Moscow, V sb. Kvant. elektronika (Quantum Electronics--collection  
of works) "Sov. radio," No 1(13), 1973, pp 137-139 (from RZh--  
Fizika, No 7, 1973, Abstract No 7D1024)

Translation: Generation is obtained in the five-micron region in  
a laser tube with a CO<sub>2</sub>+N<sub>2</sub>+He mixture cooled by liquid nitrogen.  
The oscillation was observed, and an amplification of 40 lines  
corresponding to the oscillatory-rotatory transitions of the CO  
molecule in the v'-v" interval from 4-3 to 12-11 was measured.  
Authors' abstract

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USSR

UDC 621.375.82

AVTONOMOV, V. P., ANTROPOV, Ye. T., SOBOLEV, N. N., TROITSKIY, Yu. V.  
"Separation of Rotational Lines of a CO<sub>2</sub>-Laser by a Film Selector in a Resonator"

V sb. Kvant. elektronika (Quantum Electronics -- Collection of Works), No. 3, Moscow, "Sov. radio", 1972, pp 112-115 (from RZh-Fizika, No 1, Jan 73, Abstract No ID922)

Translation: A technique is proposed for the selection of rotational-vibrational lines of radiation and for producing a single-frequency oscillation mode for a CO<sub>2</sub>-laser. Selection is achieved by tuning a reflecting interferometer formed by a thin absorbing film and one of the mirrors of the resonator. Separation of individual rotational-vibrational lines of CO<sub>2</sub> was achieved experimentally. The possibility of separation of rotational lines under retuning is shown. 8 ref. I. O. S.

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USSR

UDC 621.375.82

DEMIN, A. I., KUDRYAVTSEV, Ye. M., SOBOLEV, N. N., FAYZULAYEV, V. N.  
"Gasdynamic Laser With a High Water Vapor Content"

V sb. Kvant. elektronika (Quantum Electronics -- Collection of Works), No. 3, Moscow, "Sov. radio", 1972, pp 72-73 (from RZh-Fizika, No 1, Jan 73, Abstract No ID928)

Translation: A gasdynamic laser using a CO<sub>2</sub>-H<sub>2</sub>O-N<sub>2</sub> mixture heated by a reflected shock wave is investigated. The mixture flowed through a slit. The parameters of the gas mixture heated by the shock wave were:  $T = 1300-2250^{\circ}\text{K}$ ,  $p = 5-88$  atm. The laser amplification for a high water content in the working mixture was investigated (the magnitude of [H<sub>2</sub>O] was comparable with [CO<sub>2</sub>]). An electric discharge CO<sub>2</sub> laser was used as probing radiation. Amplification was observed up to  $[\text{H}_2\text{O}]/[\text{CO}_2] = 1$  for  $[\text{N}_2]/[\text{CO}_2] = 4$ ,  $T = 2250^{\circ}\text{K}$ ,  $p = 22$  atm. Maximum amplification in this case was observed at a distance of 22 mm from the slit and amounted to  $0.4 \cdot 10^{-2} \text{ cm}^{-1}$ . Authors' abstract.

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USSR

UDC 669.295'292'71

YELYUTIN, O. P., KALININ, G. P., SOBOLEV, N. N., and CHEMLEVA, T. A., Moscow  
"Optimum Planning of the Experiment in the Investigation of the Properties  
of Ti-V-Al Alloys"

Moscow, Izvestiya Akademii Nauk USSR, Metally, No 4, Jul/Aug 72, pp 234-238

Abstract: Mathematical methods of planning were used to establish diagrams of chemical composition and specific electric resistance for titanium-rich alloys of the Ti-V-Al system in the form of an improper simplex with the vertices  $x_1$  (100% Ti),  $x_2$  (60% Ti, 40% V), and  $x_3$  (90% Ti, 10% Al). The use of D- and G-optimum plans made it possible to construct an adequate mathematical model of the investigated diagram by means of which the value of the specific electric resistance at any point of the system can be calculated. In applying mathematical methods to the investigation of composition and properties of multicomponent systems, computer technology can be effectively applied for processing experimental data, plotting and statistically analyzing the model of the investigated dependence, analytical calculations of the studied property, and for diagrammatic representation of modeling results. Three illustrations, one table, five formulas, seven bibliographic references.

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USSR

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DOBRZHANSKIY, G. P., KITAYEVA, V. F., KULEVSKIY, L. A., POLIVANOV, YU. N.,  
POLUEKTOV, S. N., PROKHOROV, A. M., SOBOLEV, N. N., Physics Institute imeni  
P. N. Lebedev of the Academy of Sciences USSR

"Spontaneous Parametric Radiation of the  $\alpha$ -HIO<sub>3</sub> Crystal"

Moscow, Pis'ma v Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, No. 11,  
5 Dec 70, pp 505-508

Abstract: The first observation of spontaneous parametric radiation in the biaxial crystal  $\alpha$ -HIO<sub>3</sub> belonging to class 222 of the rhombic system is recorded. It is noted that if a crystal having quadratic nonlinearity is exposed to a laser beam, there is a probability of a laser photon with frequency  $\omega_H$  spontaneously decaying into two photons: a photon of the signal frequency  $\omega_1$  and a photon of an additional frequency  $\omega_2$  so that

$$\omega_H = \omega_1 + \omega_2.$$

The frequencies of the spontaneous parametric radiation  $\omega_1$  and  $\omega_2$  are determined by the dispersion characteristics of the crystal, since the process is effective if

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USSR

DOBRZHANSKIY, G. F., et al, Pis'ma v Zhurnal eksperimental'noy i teoreticheskoy fiziki, No. 11, 5 Dec 70, pp 505-508

the following condition is fulfilled:

$$k_H = k_1 + k_2,$$

where  $k_H$ ,  $k_1$ , and  $k_2$  are the wave vectors of the pumping and of the signal and additional waves. The phenomenon is termed particularly interesting, since it is observed even at pumping powers too small to excite parametric generation, and in the absence of a resonator it can be used to obtain angular, temperature, and electrooptical curves of active media suitable for use in parametric generators of light. The  $\alpha$ -HIO<sub>3</sub> crystal was transparent in the region 0.4-1.4  $\mu$  and had high nonlinear constants. No optical inhomogeneities were observed in the refractive index under the action of optical radiation of high power density, a feature very important in developing parametric generators of light. A continuous argon laser with wavelengths  $\lambda_{H1} = 4880 \text{ \AA}$  and  $\lambda_{H2} = 5145 \text{ \AA}$  with an output power of up to 1 w on each of the wavelengths was used for pumping. Parametric radiation arising in the crystal and polarized along the Y-axis was recorded in the direction of pumping propagation. Typical spectrograms of the spontaneous parametric radiation signal are given which illustrate the dependence of the signal frequency  $\omega_1$  on the direction of propagation of pumping in the crystal. It was noted that such crystals can be used as a material to produce both pulsed and continuous parametric generators tuned in the region 0.6-1.3  $\mu$ .

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USSR

UDC 621.373:530.145.6

SOBOLEV, N. N., SOKOVIKOV, V. V.

"Oscillatory Relaxation in Molecular Gas Lasers"

Elektron. tekhnika. Nauchno-tekhn. sb. Gazorazryadn. pribory (Electrical Engineering. Scientific and Technical Collection. Gas Discharge Devices), 1970, vyp. 4 (20), pp 3-7 (from RZh-Radiotekhnika, No 4, Apr 71, Abstract No 4D189)

Translation: A theoretical study was made of the oscillatory relaxation of an anharmonic oscillator system. It is demonstrated that the transition probabilities determined by the Hertzfeld method with consideration of corrections for the energy variation  $\Delta E$  can be used for these calculations. It is established that the conclusion of existence of inverse distribution between levels during the oscillatory relaxation process is correct for CO and a large number of other molecules.

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USSR

DRONOV, A. P., et al, Pis'ma v Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 11, No 11, 5 June 1970, pp 516-519

receiver (at a pressure of 1 torr). It was confirmed in the experiments that cooling of the carbon dioxide gas on expansion of the jet in a vacuum and the decrease in density lead to the fact that at some distance from the slot in the receiver a maximum inversion (and amplification) must be observed. The maximum value of  $k \sim 10$  percent  $\sqrt{k}$  is the amplification or absorption coefficient<sup>7</sup> was reached at a distance of 35 mm from the slot. Because of the nature of the amplification coefficient the axis of the resonator was located at a distance of 35 mm from the slot in the experiments to obtain generation. An oscillogram is presented showing a standard recording of generation. The length of the generation pulse coincides with the length of the amplification pulse. This agrees with the picture of infrared glow of the mixture in the receiver. Glow begins somewhat before the amplification and generation processes, and three milliseconds after the time of reflection the glow of the mixture (and its temperature) drops sharply as a result of the effect of the expansion waves arriving at the slot. This leads to a reduction in the amplification and generation.

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USSR

NOVGORODOV, M. Z., OCHKIN, V. N., SOBOLEV, N. N. (Lebedev  
Physics Institute, USSR Academy of Sciences, Moscow)

"Measurements of the Oscillatory Temperatures in CO<sub>2</sub> Lasers"  
Leningrad, Journal of Technical Physics, June 1970, pp 1268-  
1275

Abstract: The authors suggest a method for determining the oscillatory levels of N<sub>2</sub>, CO<sub>2</sub>, and CO molecules in their ground electron states by measuring the relative intensities of the electron oscillation bands (0.2) 2<sup>+</sup> of nitrogen. A comparison of the distribution functions of the nitrogen molecules with respect to the oscillation levels in the ground state X<sup>1</sup>Σ<sub>g</sub><sup>+</sup> and in the electron-excited state C<sup>3</sup>Π<sub>u</sub> is made. The dependence of the oscillatory temperatures of the ground state in the discharge in various mixtures of CO<sub>2</sub>, N<sub>2</sub>, and He on the discharge current and gas pressure is found. Variations in the band intensity as a function of these same parameters are determined.

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USSR

UDC: 621.378.385

NOVGORODOV, M. Z., SVIRIDOV, A. G., and SOBOL'EV, N. H.

"Electrical Characteristics of a CO Laser Discharge Plasma"

Leningrad, Zhurnal tekhnicheskoy fiziki, vol 42, No 7, 1972,  
pp 1471-1478

Abstract: The experiments described in this paper are aimed at measuring the electronic concentration in the plasma of a carbon monoxide laser discharge and investigating the characteristics of the plasma. It is assumed that, as in the CO<sub>2</sub> laser, the process providing the pumping to the oscillatory level of CO is basically electronic shock. This hypothesis can only be verified if the concentrations and distribution functions of the electron energy are known. The experiments were conducted by the microwave method using cylindrical resonators, with the discharge realized with d-c current in quartz tubes of 3.4 or 2.0 cm diameter. A description of the experimental procedure is given, and the experimental results are presented in the form of curves for the electron concentration as a function of the discharge current in CO and He in various mixture proportions. The electron concentration is a direct linear function of the discharge current density, and a table of the proportionality constant for various combinations of  
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USSR

UDC: 621.378.385

NOVGORODOV, M. Z., SVIRIDOV, A. G., SOBOLEV, N. N., and SHVARTS, P.

"The Energy of the Electrons in a CO Laser Discharge"

Leningrad, Zhurnal tekhnicheskoy fiziki, No 10, 1972, pp 2190-2197

Abstract: To understand and optimize the operation of CO lasers, one must know the characteristics of the plasma discharge electron component, particularly parameters like the full electron concentration and the electron energy distribution. With this assertion the authors present the results of their measurements of the distribution function of electron energies in CO-O<sub>2</sub>-He laser in terms of the discharge current, pressure, and channel. The measurement method, involving the second derivative of the plasma probe current with respect to the voltage by the so-called second-harmonic method, is basically the same as that used in an earlier paper (M. Z. Novgorodov, et al, IEEE J., QE-7, No 11, 1971, p 508). Data is given for the CO-O<sub>2</sub>-He combination in the proportions of 1:0.1:10 and 1:0.1:50, curves for the electron energy distribution are plotted, and the effects of adding Xe to the mixture are discussed. It is noted that computations of the distribution function from the  
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USSR

UDC: 621.378.385

NOVGORODOV, M. Z., et al, Zhurnal tekhnicheskoy fiziki, No 10,  
1972, pp 2190-2197

formula for elastic collisions give misleading results; an exact  
solution of the kinetic equation with the correction of all pos-  
sible processes taken into account is necessary.

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USSR

UDC 681.325.3

SOBOLEV, P. F."Analog-Digital Current Converter With Accumulating Element"

Kontrol' Upr. i Peredacha Inform [Testing, Control and Transmission of Information -- Collection of Works], Leningrad, Nauka Press, 1970, pp 93-101 (Translated from Referativnyy Zhurnal Avtomatika, Telemekhanika, No 5, 1971, Abstract No 5B 486 by N. V.)

Translation: An analog-digital converter is described which is based on the principle of counting of pulses using an integrating condenser. The device contains a 3-winding transformer, an accumulating element, a binary counter, and a control circuit. Conversion is performed as follows: Current to proportional pulse to accumulating element to code. The current is converted to a proportional pulse using the 3-winding transformer, which is essentially a magnetic modulator. The pulses, the charge of which is proportional to the measured current, move from the output winding of the modulator to the accumulating element and simultaneously to the binary counter. When the accumulating element is fully filled, the electronic circuit records a number in the counter which is the digital equivalent of the measured current. An accuracy of 0.02% is achieved at the calibration temperature and 0.05% in the temperature interval from -20 to +60°C. 3 figs, 3 biblio refs.

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SOBOLEV, S.F.

GEOCHEMISTRY

METALLURGY AND MINERALS

DETERMINING THE PRESENCE OF GOLD IN BASIC AND ACIDIC ROCK FORMATIONS OF THE URALS

Article by S. F. Sobolev, G. H. Anoshin, and G. A. Peregudin of the Institute of Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements of the Academy of Sciences of the USSR and of the Ministry of Geology of the USSR, Moscow and of the Institute of Geology and Geochemistry of the Siberian Scientific Center of the Academy of Sciences, USSR, Novosibirsk; Moscow, Serya GeolSibGIZ/2, Izvestiya Akademii Nauk SSSR, Russian, No. 10, 1971, numbered to editors 27 October 1971, pp. 68-70

Source: PRS# 61216  
13 Feb 74  
G.L. ...

Among the many ore regions, the Urals are known as the oldest gold-ore province of the USSR, where native and placer deposits of gold are related to the acid intrusive and basic effusive formations. Moreover, since the past century, the permanent presence of gold in placer deposits of native platinoids, genetically related to masses of ultrabasic rock, developed very extensively in the Urals, has been known.

In connection with the little studied geochemistry of gold in ultrabasic and basic rocks and the great amount of interest which they have for the geochemistry of deep mantle formations, materials of original mineralogical and geochemical investigations of the most important basic and acidic formations of the zone of the Main Urals Fracture were presented as the object of investigation.

The Geological and Petrological Features of the Objects of Investigation

The Urals petrographic province is a classical zone of development of ultrabasic and basic rock, which forms a number of acidic and ultrabasic formations. Of greatest interest to understand the material composition of the deep zones of the Urals geosyncline are the extensively studied basic and acidic formations.

The rock masses contained in these formations are native to the zone of the Main Urals Fracture of deep spreading, which separates the ancient metamorphic zone of the Ural-Tau from the zone of development of large sedimentary effusive gneissic strata of the Tajik-Magnitogorsk synclinorium.

We are now conducting a wide search for new methods of wages and material stimulation, and just a list of the experiments which are being conducted would fill an entire newspaper page.

A number of ministries -- more or less of the electrical engineering, machine building -- are studying and encouraging these experiments. However, certain ministries and departments prefer an easier path. Instead of improving the methods of stimulating production and increasing the effectiveness of science, they seek to get a mechanical increase in wages by means of the establishment of all kinds of coefficients, shifting enterprises, institutes, and organizations to higher wage categories, and so forth. What can be said about this? You cannot raise a branch without changing labor. And to improve stimulation without first conducting experiments is also impossible because stimuli have to pass through a person's consciousness and abstract calculations alone may in practice prove to be ineffective.

A study and generalization of the results of the experiments will provide important material for a further improvement of the systems of stimulation which are in keeping with the demands of the current stage of our socialist economy. Perhaps in 1974 Il'ya Gerasimov will describe the most interesting experiments in the field of stimulating labor. Can we hope for that?

Question: Indeed!... Thank you for the interview about our readers' letters.

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CSO: 1822-W

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USSR

UDC 669.046.5

KOCHO, V. S., BOGUSHEVSKIY, V. S., and SOBOLEV, S. K.

"Improving the System for Determining the Time of Shutting Down Blowing in an Oxygen Converter"

Moscow, V sb. "Sovremennyye problemy kachestva stali" (MISIS) (Collection of Works. Modern Problems of Steel Quality) (Moscow Institute of Steel and Alloys), Izd-vo "Metallurgiya," No 61, 1970, pp 178-180

Abstract: Results are presented of an investigation of the dynamics of carbon burning in a 100-ton converter of the Krivoy Rog metallurgical plant. A close relationship is established between the rate of converter bath decarburization and the pressure of exhaust gases under the dome. An algorithm is presented for determining the carbon content in the converter bath, based on the balance-statistical method, taking into account the variation pattern of parameters closely related to the decarburization rate of the converter bath. An analog computing system was developed for the continuous determination of carbon content in the converter bath. Problems related to self-alignment of the converter process are considered.

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USSR

SOBOLEV, V., and DARDA, P.

Moscow, Veterinariya, No 8, 1973, p 123

Translation: A coordination conference on foot-and-mouth disease was held in March of this year at the All-Union Foot-And-Mouth Disease Research Institute. The conference was attended by about 100 persons, with the participation of scientists from Soviet veterinary research establishments and heads of the main veterinary administrations of the ministries of agriculture of the Soviet republics.

The participants of the conference discussed the epizootic state of foot-and-mouth disease and methods of combating it, as well as results of studies conducted in this field in 1972 and study plans for 1973.

P. P. Rakhmanin, assistant chief of the main veterinary administration of the USSR Ministry of Agriculture discussed the epizootic state and the means employed to eradicate foot-and-mouth disease, while the director of the All-Union Foot-And-Mouth Research Institute, V. P. Onufriyev, covered the results of studies conducted in 1972 and the program of scientific studies for 1973.

Participating in the discussions following the talks were the directors of veterinary services of the union republics, scientific associates of

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USSR

SOBOLEV, V., and DARDA, P., Veterinariya, No 8, 1973, p 123

Research establishments should accelerate their efforts to produce a highly immunogenic vaccine against foot-and-mouth disease agent, and for the disinfection of milk and milk products in farm enterprises at risk; enhanced efforts should also be made to optimize the immunizing doses of the anti-foot-and-mouth vaccine, predicting the prognosis of active infections, and in formulating practical recommendations along these lines.

The coordination conference passed a resolution calling for careful analysis of the epizootic state of foot-and-mouth disease and the effectiveness of measures taken to prevent the disease in regions where research institutes are active, and to introduce timely corrections into eradication plans relying primarily on prevention, as well as to investigate the course of the disease in the different areas of the USSR and to keep a careful record of foci where foot-and-mouth disease had been previously encountered. In addition, measures must be introduced to elevate the hygienic levels of animal breeding farms, dairies, and meat plants.

The time is ripe for completing studies on the intensity and duration of immunity, and for establishing the optimum doses and schedules for the immunization of large and small livestock with respect to species, age, and physiological state; in addition, the epizootiology of viral carriers and a number of other problems must be studied.

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USSR

SOBOLEV, V., and DARDA, P., Veterinariya, No 8, 1973, p 123

The participants of the conference unanimously agreed to exert maximum effort to increase the efficacy of anti-epizootic measures and to contribute to the successful completion of the plans of the final year of the fifth Five-Year Plan.

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METALLURGY AND MINERALS

EXPENDITURES IN REPAIR WORK AT METALLURGICAL AGGREGATES

3/1/74

Article by N. Ustrenko, deputy director of the Scientific Research Institute of Ferrous Metallurgy for scientific work, V. Sobolev, chief of the repair work economy laboratory, and N. Gol'dilern, senior laboratory engineer; Moscow, Izvestia, Kuznets, 8 September 1971, p. 2, 674637.

During the past three years, upwards of five million rubles has been spent on equipment repairs at enterprises of the USSR Ministry of Ferrous Metallurgy. These expenditures exceeded by 30 percent the cost of the production assets of a metallurgical plant as large as the Magnitogorsk Combine.

Today the attention of metallurgists is basically riveted on developing basic production, and repair work is of secondary importance. At the same time, from the point of view of economy, it is no less important a project for improvement than any other technological aspect of metal production. Statistics confirm that the overall cost of repairs at a metallurgical plant is 210 percent more than expenditures on blast furnace shops and 700 percent more than expenditures on pig-iron production.

About two-fifths of all industrial production personnel are engaged in repair in metallurgy. If, however, one takes into consideration the staffs of the repair trusts and collectives supplying these services with refractory materials and also the expenditures of labor connected with releasing the metal used here, then one finds that one of every two workers in metallurgy is directly or indirectly engaged in repair.

The high growth rates in these expenditures are a special danger. Whereas in 1966 13.7 rubles was spent on each ton of steel in the branch, in 1971 this figure was 17.5 rubles. This signifies that the overall cost of rebuilding the units has grown by 425 million rubles.

What caused such an undesirable process? There are many reasons. These include intensification of production not supported by adequate reliability and durability of the equipment used, increased reduction in the time

G.H.W.

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SOBOLEV, V.

JPRS 60158 28 Aug. 1973  
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USSR

UDC 535.36+523.035

SOBOLEV, V., Corresponding Member of the Academy of Sciences of the USSR

"The Relationship Between the Emissivity and Absorptivity of a Medium"

Moscow, Doklady Akademii Nauk SSSR, Vol 209, No 5, 11 Apr 73, pp 1071-1073

Abstract: Under conditions of thermodynamic equilibrium, this relationship is given by Kirchhoff's law. The relationship under nonequilibrium conditions for monochromatic light was previously discussed by this author (Astrofizika, No 8, 1972, p 197). The present article extends this method to spectral illumination.

The method involves finding an expression for the probability of scattering as a function of the location of a point within the volume of the medium, the frequency of the illumination and the solid angle with the incident beam, and then integrating these values over the entire volume. The result is that for a given volume of the medium illuminated by parallel rays the ratio of the energy at a given frequency which is absorbed to the energy at the same frequency which is radiated is equal to the ratio between the coefficient of natural absorption and the coefficient of scattering, assuming that the sources are uniformly distributed within a unit solid angle along the  
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USSR

SOBOLEV, V., Doklady Akademii Nauk SSSR, Vol 209, No 5, 11 Apr 73, pp 1071-1073

direction opposite to the direction of incidence. It is also shown that the ratio holds when the incident radiation is not in parallel rays. The ratio derived holds for a volume of arbitrary shape.

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USSR

UDC: 621.371.332

KRIVOZUBOV, V. P., SCBOLEV, V. A.

"Nonlinear Distortions Caused by Three-Beam Reception on Open Flat Radio Relay Line Ranges"

V sb. Radioelektron. v nar. kh-ve SSSR, Ch. 2 (Radioelectronics in the National Economy of the USSR, Part 2--collection of works) Kuybyshev, 1970, pp 227-253 (from RZh-Radiotekhnika, No. 3, March 71, Abstract No. 3A222)

Translation: Nonlinear distortions and transient noise, caused simultaneously by reflections from layered, nonuniform tropospheres and from the intersecting underlying surface of the earth, are considered. The amplitude of the nonlinear distortions for the second and third harmonics is determined. It is shown that its maximum occurs in the region of interference minima. Four illustrations, bibliography of four. H. S.

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USSR

UDC 532.696

ZORIN, Z. M., SOBOLEV, V. D., CURAYEV, N. V., Institute of Physical Chemistry,  
Acad. Sc., USSR, Moscow

"The Effect of Polymolecular Adsorption on the Diffusion of Vapors in Micro-  
capillaries. II. Experimental Data"

Moscow, Zhurnal Fizicheskoy Khimii, Vol 46, No 5, May 72, pp 1127-1129

Abstract: Experiments were carried out to check on the theory of vapor dif-  
fusion in fine cylindrical capillaries reported in the preceding paper.  
Quartz microcapillaries with internal diameter  $10^{-5}$ - $10^{-3}$  cm were used. A  
10-15 cm long capillary sealed on both ends was placed horizontally, with one  
end immersed in liquid nitrogen bath. The other end was then immersed in a  
bidistillate, the movement of the liquid being observed through a microscope.  
When the water reached the cold zone it froze and the movement stopped. Then  
the other end of the capillary was sealed off and the system placed in a thermo-  
statically controlled container to reach an equilibrium. Experimental data  
obtained agreed well with those calculated from proposed theoretical consider-  
ations.

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UDC 621.38.836.112.15c24

USSR

BERKOVSKAYA, K.F., KIRILLOVA, N.V., KONAKOVA, R.V., KRASYUK, B.A., MESKIN, S.S.,  
RAVICH, V.N., SOBOLEV, V.I., SHUMAN, V.B.

"Opticoelectronic Pair, Light-Emitting Diode--Photthyristor: New Element Of  
Electronic Apparatus"

V sb. Mikroelektronika (Microelectronics--Collection Of Works), Moscow, Izd-vo  
"Sovetskoye Radio," No 4, 1971, pp 216-228

Abstract: The possibilities are analyzed of a new type of opticoelectronic pair, GaAs light-emitting diode--Si photthyristor. The characteristics and parameters are furnished of light-emitting diodes and photthyristors of various types. The possibilities of their optimum combination are considered. Specific regimes of operation are recommended and the parameters of the opticoelectronic pair are presented for three regimes of operation. 6 fig. 3 tab. 8 ref.

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USSR

BAR'YAKHTAR, V. G., KLEPIKOV, V. F., and SOBOLEV, V. L. (Khar'kov State University)

"Ground States and Nuclear Magnetic Resonance in Thin Magnetically Ordered Films"

Leningrad, Fizika Tverdogo Tela, May 1971, pp. 1454-1462

Abstract: The ground state of a thin magnetically ordered film in which the character of the surface magnetic anisotropy is different from the character of the voluminal magnetic anisotropy was studied. The distributions of the magnetic intensity of a ferromagnetic film as well as the vectors of the anti-ferromagnetism and magnetic intensity of an antiferromagnetic film in the ground state was determined. These distributions are described by Jacobian elliptic functions. The static local and integral magnetic susceptibility of a film were calculated, and it was shown that for given thicknesses of the film a phase magnetic transition of the second kind occurs, during which the components of the tensor of magnetic susceptibility undergo an abrupt change. The amplification factors of the nuclear magnetic resonance were calculated.

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USSR

SOBOLEV, V. N.

"Device for Statistical Information Processing"

Moscow, Otkrytiya, izobreteniya, promyshlennyye obraztsy, tovarnyye znaki,  
No 33, 1972, p 117, Author's Certificate No (11)357565

Abstract: The device is made up of a computing block, a memory block, and a recording device connected to the computer block output. The purpose of the device is to compute dispersions and dispersion and correlation functions of random processes. Some details of the interconnections of these blocks are given.

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USSR

UDC 541.15

SOBOLEV, V. S., ZAIDES, A. L., and KLAUZEN, N. A., Scientific Research  
Institute of Tire Industry, Moscow

"The Effect of Radiation Temperature on the Nature of Radiation Induced  
Structuralization of cis-Polybutadiene"

Moscow, Khimiya Vysokikh Energiy, Vol 7, No 4, Jul-Aug 73, pp 358-361

Abstract: An increase in the temperature of  $\gamma$ -irradiation of the stereo-regular polybutadiene in the range 20-160° leads to considerable increase in the rate of crosslinking. At the same time the strength of unfilled vulcanizates is decreased, as well as the maximum degree of crystallization and intensity of crystal formation during the stretching. It has been assumed that these changes are connected with the polymerization processes taking place, leading to the formation of polyfunctional nuclei.

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USSR

UDC: 621.378.525:532.57

DOMARATSKIY, A. N., KUDRYAVTSEV, M. B., SOBOLEV, V. S., SHMOYLOV, N. F., and YURLOV, Yu. I.

"Investigating the Effect of Scattered Particle Concentration on the Correlation Time of the Laser Doppler Velocity Measurement Signal"

Novosibirsk, Avtometriya, No 5, 1972, pp 122-125

Abstract: The experimental investigation of the effect of scattered particle concentration on the change in the statistical characteristics of a Doppler signal is described. It was conducted for the change in the maximum correlation time of the Doppler signal correlation function. A diagram of the experimental apparatus, involving a single laser type LG-75, operating in the TEM<sub>00</sub> mode, is given. The single beam from the laser is split in two by a dividing plate, with the diameters of each beam measuring 0.02 and 0.1 cm, and both are then converged on a bulb of double-distilled water. The result is the formation of an interference pattern. It is concluded from the experiment that the correlation time and the correlation function of the Doppler signal are dependent on the change in scattered particle concentration if there

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USSR

UDC: 621.378.525:532.57

DOMARATSKIY, A. N., et al, Avtometriya, No 5, 1972, pp 122-125

are fewer than 10 particles in the scattering space and are independent of the change if there are, on the average, 15-70 scattered particles.

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1/3 012 UNCLASSIFIED PROCESSING DATE--02OCT70  
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AUTHOR--(05)-SOMOLEV, V.S., BAKUMENKO, I.T., DOBRETSDV, N.L., SOMOLEV,  
N.V., KHLESTOV, V.V.  
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CIRC ACCESSION NO--AP0114442

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. SOME ASPECTS OF MAGMA FORMATION IN RELATION WITH WATER REGIME BASED UPON RECENT DATA OBTAINED BY THE AUTHORS CONCERNED TO THE UPPER MANTLE COMPOSITION AND TEMPERATURE OF FORMATION OF IGNEOUS ROCKS ARE CONSIDERED IN THE PAPER. THE STUDY OF XENOLITHS IN KIMBERLITES AND CRYSTALLINE INCLUSIONS IN DIAMONDS PROVES THE GREAT DIFFERENTIATION OF THE UPPER MANTLE FROM PREDOMINANT PERIDOTITES UP TO ECLOGITES AND GROSPYDITES. THE DIAMOND BEARING PERIDOTITES ARE THE DEEPEST ORIGIN XENOLITH'S. THE BIODITE INCLUSIONS DOESN'T YET FOUND IN DIAMONDS BUT PHLOGOPITE IS PRESENT IN THE MOST UPPER PART OF THE MANTLE ACCORDING SOME DATA, AND KIMBERLITIC MAGMA ITSELF IS FORMED IN WATER PRESENCE. THE DEEP FLUIDES ARE OF COMPLEX COMPOSITION, AND PARTIAL WATER PRESSURE FLUCTUATES WITHIN A WIDE RANGE. DEPENDING ON RELATIVE VALUE OF P, H, SUB2 O, THREE TYPES OF MAGMAS CAN BE DISTINGUISHED: I. THE MOST "DRY" MAGMAS, WHICH CAN BE ERUPTED UP TO THE SURFACE; II. MAGMAS, FORMED AT HIGH P SUBTOTAL AND DECREASED P H AND INCREASED P H SUBW O WHICH ARE ABLE TO ASCEND; III. MAGMAS FORMED AT LOW P SUBTOTAL (MIGMATITE FIELD). IT PROVED THAT TRANSVAPORIZATION PLAYS A SIGNIFICANT ROLE, IT DECREASES THE MELTING TEMPERATURE AND IMPROVES THE POSSIBILITY OF MAGMA ASCENDING. THE PROBLEMS OF DRAINAGE OF HOST TERRANES FLUIDS AT MAGMA FORMATION AND FLUIDS RELEASE AT MAGMA CRYSTALLISATION ARE ALSO CONSIDERED. THE SPECIAL DIAPHTHORESIS PHENOMENON IS CONNECTED WITH THESE PROBLEMS.

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3/3 012

UNCLASSIFIED

PROCESSING DATE--02OCT70

CIRC ACCESSION NO--AP0114442

ABSTRACT/EXTRACT--THE PROBLEM OF FURTHER STUDY OF VITREOUS AND GAS LIQUID INCLUSIONS IN MINERALS FOR THE PURPOSE OF MORE PRECISE MODEL OF WATER REGIME CONSTRUCTION IN THE EARTH'S CRUST AND MANTLE IS POSED.

UNCLASSIFIED

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USSR

"A Compass for Mineral Prospectors"

Russian, Frunze, Sovetskaya Kirgiziya, 15 February 1970, p 2

Abstract: The map, which was compiled jointly by the Institute of Geology of the Kirgiz SSR Academy of Sciences and the Institute of Geology and Geophysics of the Siberian Department of the USSR Academy of Sciences, reflects degrees of change in types of rock depending on temperature and pressure in the earth's crust and on tectonic movements.

The first of its type in Central Asia and Kazakhstan and the most detailed in the Soviet Union, this map takes in a wide expanse of territory, including Kirgiziya, eastern Uzbekistan, southern Kazakhstan and part of Tadzhikistan. It will be part of an analogous all-union map, and will be useful to geologist in locating mineral deposits.

Candidates of geological-mineralogical sciences A. Bakirov and N. L. Dobretsov compiled the map, with essential help from map editors, academician V. S. Sobolev and candidate of geological-mineralogical sciences V. G. Korolev.

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USSR

UDC 621.375.82

DUBNISHCHEV, Yu. N., KORONKEVICH, V. P., SOROLEV, V. S., STOLPOVSKIY, A. A.,  
SENIN, A. G., UTKIN, Ye. N., VASILENKO, Yu. G., SHMOYLOV, N. F.

"Development of the Doppler Method for Measuring Flow Rate"

V sb. Konf. po avtomatiz. nauch. issled. na osnove primeneniya ETsVM, 1972  
(Conference on the Automation of Scientific Research on the Basis of Com-  
puter Applications, 1972 -- Collection of Works), Novosibirsk, 1972,  
pp 63-70 (from RZh-Fizika, No 11, Nov 72, Abstract No 11D976)

Translation: A two-channel compensation circuit for a laser Doppler device  
for measuring velocity is proposed. Use of this device makes it possible to  
lower considerably the level of the low-frequency component of the signal,  
which causes disturbance in processing the signal. The potential possibili-  
ties of the method of electronic processing of a Doppler signal are con-  
sidered theoretically from the aspect of the accuracy of the measurements.  
The possibilities of the device are illustrated by an autocorrelation func-  
tion for different average flow rates. A. I. Serbin.

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USSR

DONETSKIKH, V. I., and SOBOLEV, V. V.

"Optical Reflectance Spectra of  $A^{II}B^{IV}C_2^V$  Group Compounds in the Region of Their Fundamental Absorption"

Kishinev, Izvestiya Akademii Nauk Moldavskoy SSR, Seriya Fiziko-Tekhnicheskikh i Matematicheskikh Nauk, No 1, 1973, pp 40-46

Abstract: A study was made of the reflectance spectra of seven crystals of the  $A^{II}B^{IV}C_2^V$  group ( $ZnSiAs_2$ ,  $ZnGeAs_2$ ,  $ZnSnAs_2$ ,  $CdGeAs_2$ ,  $CdSnAs_2$ ,  $ZnSiP_2$ ,  $ZnSnP_2$ ) in the 1.5-5.5-ev region at 293 and 77° K and in the 5-12.5-ev region at 293° K. The structure of the spectra was found to be much more complex than expected, in the form of 10-12 bands. General regularities were found in the variation in related transition energies as a function of the lattice parameter for crystals of the subgroup  $Zn(Cd)B^{IV}As_2$  and  $ZnB^{IV}P_2$ , and the interband transitions were predicted for unstudied  $CdSiAs_2$ ,  $ZnGeP_2$ , and

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