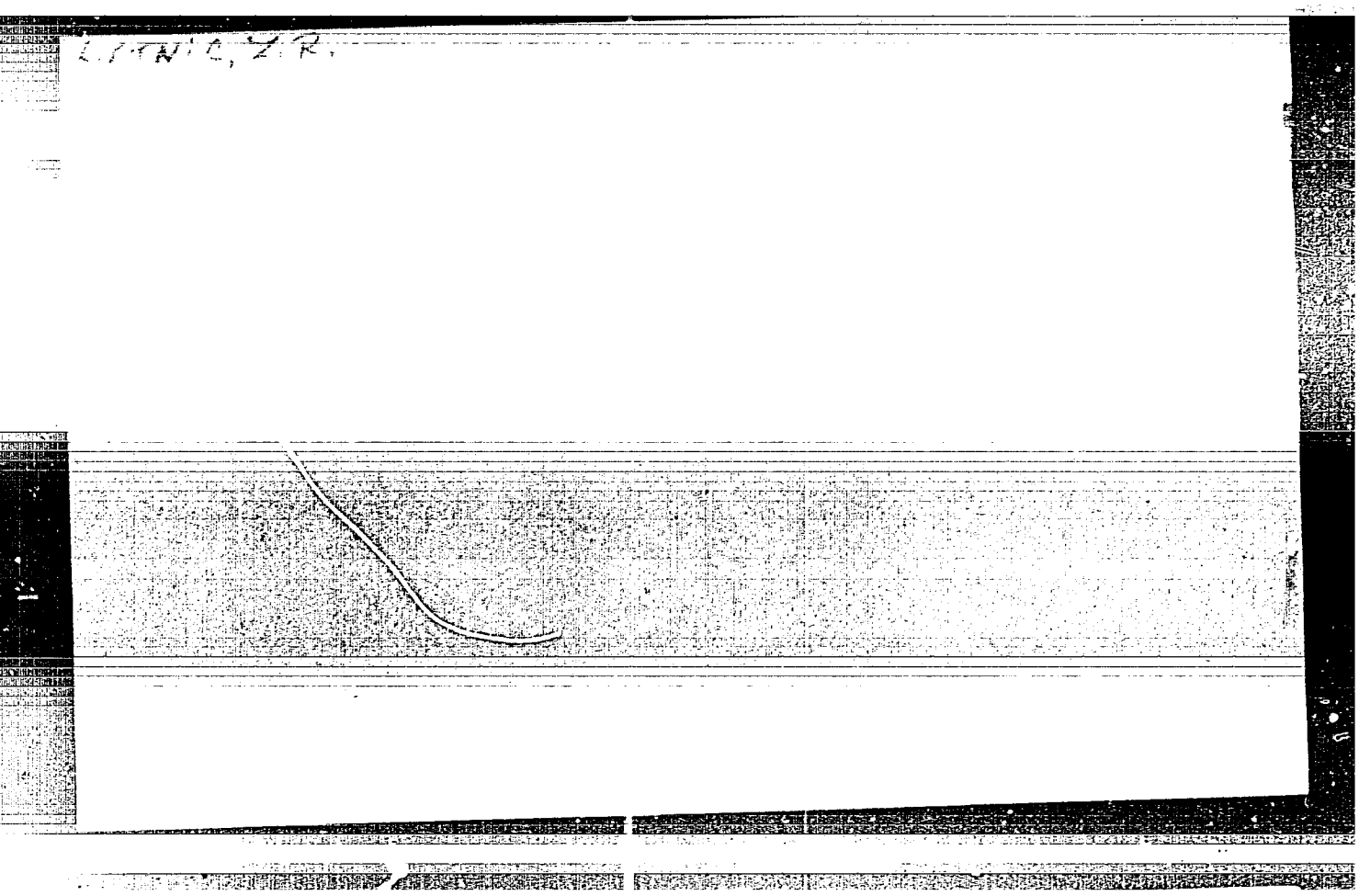
SITKOVSKIY, P.A.; KOMAROV, G.V.; BRUSENTSEV, V.F.; KREMENETSKIY, N.N.; MAMAYEV, M.G., kand.tekhn.nauk; SMIRNOV, A.V., kand.tekhn.nauk; AFANAS'YEV, I.V.; VOLOD'KO, I.F., kand.tekhn.nauk; BEGLYAROV, S.A.; KONDRAT'YEV, V.V.; KARLINSKAYA, M.I.; NIKOLAYEV, M.I., kand.tekhn. nauk; DOROKHOV, S.M.; PISHCHUROV, P.V.; KLIMENTOVA, A.V.; ROZENBLAT, Zh.I.; FANDEYEV, V.V., kand.tekhn.nauk; KULIKOV, P.Ye.; SHIMANOVICH, S.V.; DELITSIN, M.V., retsenzent; BRAUDE, I.D., retsenzent; BARYSHEV, A.M.; retsenzent; GRIGORYANTS, A.S., retsenzent; IGNATYUK, G.L., retsenzent; KALABUGIN, A.Ya., retsenzent; KREMENETSKIY, N.D., retsenzent; POPOV, K.V., retsenzent; ORLOVA, V.P., red.; LETHEV, V.Ya., red.; SOKOLOVA, N.N., tekhn.red.; FEDOTOVA, A.F., tekhn.red.

[Handbook for hydraulic and agricultural engineers] Spravochnik gidrotekhnika melioratora. Moskva, Gos.izd-vo sel'khoz.lit-ry, 1958. 766 p. (MIRA 12:3)
(Hydraulic engineering) (Agricultural engineering)



LETNIK, A.L.

VRASHEV, S.P.; LETNIK, A.L.; SHIFRIN, D.M.

[Machinery] Mashinovedenie. Moskva, Mashgiz, 1954. 463 p.
(MLRA 8:2D)

LETNIK, A L

25(2) PHASE I BOOK EXPLOITATION SOV/2181

Vrashev, Sergey Pavlovich, Engineer, Aleksandr L'vovich Letnik, Docent, and Daniil Moiseyevich Shifrin, Engineer

Mashinovedeniye (Science of Mechanical Engineering) Moscow, Mashgiz, 1956. 463 p. 80,001-155,000 copies printed.

Ed. (Title page). V.M. Tareyev, Doctor of Technical Sciences, Professor; Ed. (Inside book): F.B. Nel'son-Skornyakov, Laureate of the Stalin Prize, Doctor of Technical Sciences, Professor; Reviewers: N.K. Korneychuk, Candidate of Technical Sciences, and I.P. Lukin, Candidate of Technical Sciences; Tech. Ed.: S.M. Popova; Managing Ed. for Literature on Machine Building and Instrument Making: N.V. Pokrovskiy, Engineer.

PURPOSE: The book is a textbook for the course, Science of Mechanical Engineering, for tekhnikums in which the Science of Mechanical Engineering is taught as a general engineering course.

COVERAGE: The book presents basic information on hydraulics, en-

Card 1/17

gineering thermodynamics, and the theory of heat transfer. The operation and construction of turbines, pumps, steam boilers, furnaces, steam engines, steam turbines, and internal combustion engines are discussed. No personalities are mentioned. There are 41 references, all Soviet.

TABLE OF CONTENTS:

Science of Mechanical Engineering

SECTION 3. FUEL AND BOILER PLANTS

Science of Mechanical Engineering

Science of Mechanical Engineering

Science of Mechanical Engineering

SECTION 4. STEAM ENGINES

VRASHEV, Sergey Pavlovich,inzh.; LETNIK, Aleksandr L'vovich, dots.; SHIFRIN, Daniil Moiseyevich, inzh.; TANKIEV, V.M.,prof.,doktor tekhn. nauk, red.; SHERSTIUK, A.N.,kand. tekhn. nauk, retsenzent,; KVITKOVSKIY, Yu.V., kand.tekhn.nauk, red.; MOLDKL', B.I.,tekhn. red.

[Machinery] Mashinovedenie. Izd. 2., dop. i perer. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1958. 483 p. (MIRA 11:12)

(Machinery)

LETNIK, A.L.

PHASE I BOOK EXPLOITATION 30V/2942

25(2)

Vrashev, Sergey Pavlovich, Engineer; Aleksandr L'vovich Letnik, Docent; and Daniil Moiseyevich Shifrin, Engineer

Mashinovedeniye (Machine Science) 2d ed., rev. and enl. Moscow, Mashgiz, 1959. 483 p. 70,000 copies printed.

Reviewer: A.N. Sherstyuk, Candidate of Technical Sciences; Eds.: V.M. Tareyev, Doctor of Technical Sciences, Professor, and Yu. V. Kvitkovskiy, Candidate of Technical Sciences; Tech. Ed.: B.I. Model'; Managing Ed. for Literature on Machine and Instrument Construction (Mashgiz): N.V. Pokrovskiy, Engineer.

PURPOSE: This textbook is intended for students of tekhnikums taking the course. Machine Science.

COVERAGE: This textbook contains basic information on hydraulics, engineering thermodynamics, and the theory of heat transfer. Included are the working principles, arrangement, and construction of pumps, hydraulic turbines, steam boilers, furnaces, compressors, air blowers, steam engines, steam turbines, internal combustion engines, gas turbines, and jet engines.

Card 1/19

LETNIK, S. F. and DOLZHENKO, S. V.

Letnik, S. F. and Dolzhenko, S. V. - "On treating burns to the intestine with caustic chemicals, and the results of these burns", Vracheb. delo, 1949, No. 5, paragraphs 409-12.

SO: U-4630, 16 Sept. 53, (Letopis 'Zhurnal 'nykh Statey, No. 23, 1949).

LETNIK, S.F., professor; RODIN, V.I., assistent; CHERNOV, D.Ye. kandidat med. nauk.

Dispensary services in the prevention of diseases of the upper respiratory tract in miners of the Donvets Basin. Vest. oto-rin. 17 no.6:30-33 N-D '55. (MLRA 9:2)

1. Iz kafedry bolezney ukha, gorla, i nosa (zav. prof. S.F. Letnik) Meditsinskogo instituta (Stalino)
(RESPIRATORY TRACT, diseases,
prev. & control in miners)
(MINING,
upper resp. tract dis. in miners, prev. & control)

Letnik, S. F.

LETNIK, S.F., prof.; SHAPARENKO, B.A., assistent

Difficulties and errors in the diagnosis of endocranial otogenic complications in intracranial hemorrhages [with summary in English]. Vest.oto-rin. 19 no.6:36-41 N-D '57 (MIRA 11:3)

1. Iz kliniki bolezney ukha, gorla i nosa (zav.-prof. S.F. Letnik) Stalinskogo meditsinskogo instituta, Donbass.
(CEREBRAL HEMORRHAGE, differential diagnosis
endocranial otogenic compl. (Rus)
(OTITIS MEDIA, complications,
endocranial otogenic compl., differ. diag. from cerebral hemorrh. (Rus)

LETNIK, B.F., prof. (Stalino)

Achievements of Soviet otolaryngology in improving workers' health and in preventing otorhinolaryngological occupational diseases. Zhur. ush., nos. i gorl. bol. 20 no.5:3-8 S-O '60. (MIRA 14:6)

(OTOLARYNGOLOGY)

LETNIK, S.F., prof.; RODIN, V.I., kand.med.nauk

Report on the activity of the Stalino Province Otolaryngological Society for 1959. Zhur. ush., nos. i gorl. bol. 20 no.5:87-90 S-O '60. (MIRA 14:6)

1. Predsedatel' oblastnogo Otorinolaringologicheskogo obshchestva (for Letnik). 2. Sekretar' oblastnogo Otorinolaringologicheskogo obshchestva (for Rodin).
(STALINO PROVINCE--OTOLARYNGOLOGICAL SOCIETIES)

LETNIK, S.F., prof.; RODIN, V.I., kand.med.nauk

Account of the activity of Donetsk Province Scientific Society of Otolaryngologists during 1960. Zhur.ush., nos.i gorl.bol. 21 no.6:83-86 N-D '61. (MIRA 15:11)

1. Predsedatel' Donetskogo oblastnogo nauchnogo obshchestva otolaringologov (for Letnik). 2. Sekretar' Donetskogo oblastnogo nauchnogo obshchestva otolaringologov (for Rodin).
(DONETSK PROVINCE--OTORHINOLARYNGOLOGICAL SOCIETIES)

LETNIK, G. S. (SATYUKOVA, G. S.) Cand. Med. Sci,

Dissertation: "The Innervation of Stomach Arteries." First Moscow Order of Lenin Medical Inst. 23 Dec 47.

SO: Vechernyaya Moskva, Dec, 1947 (Project #17836)

LETNIK-SATYUKOVA, G. S.

Data on innervation of the arch of the aorta and of the thoracic aorta in experimental conditions and in injuries of the aorta; preliminary communication. Arkh. anat., Moskva 30 no.5:72-77 Sept-Oct 1953. (CLML 25:4)

1. Of the Department of Normal Anatomy (Head -- Prof. G. F. Ivanov), First Moscow Order of Lenin Medical Institute.

LETNIKOV, B.

Bee Culture - Crimea Province

In the apiary of the leading beekeeper of Crimea Province. Pchelovodstvo 30, No. 2, 1953.

9. Monthly List of Russian Accessions, Library of Congress, June 1953, Uncl.

NARVAYT, G.E.; ANDRYUSHIN, V.V.; BELETSKIY, Yu.S.; LETNIKOV, F.A.

Methods of studying the primary halo of dispersed uranium and admixture elements in hydrothermal deposits. Vest. AN Kazakh. SSR 18 no.4:69-78 Ap '62. (MIRA 16:11)

LEVINIKOV, F.P.

Chemical affinity of elements and its possible use in geochemistry.
Vest. AN Kazakh. SSR 19 no.12:70-74 D '63. (MIR: 17:12)

LETNIKOV, Feliks Artem'yevich

[Isobaric potentials of mineral formation (chemical affinity) and their application in geochemistry] Izobarnye potentsialy obrazovaniia mineralov (khimicheskoe srodstvo) i primenenie ikh v geokhimii. Moskva, Nedra, 1965. 114 p. (MIRA 18:10)

LETNIKOV, G.V.

Seasonal variations of the nature of jet streams. Trudy TSIP no.122:69-73 '63. (MIRA 16:9)

POPOV, V., mayor; [illegible], Yu., kapitan

Rocket gunners always in combat readiness. Komm. Vooruzh. Sil 4 no.16:46-48 Ag '64. (MIRA 17:10)

LETNIKOV, IU. S.

AN EXPERIMENT IN THE PRODUCTION OF LARGE DIAMETER SPHERICAL TANKS UNDER CONSTRUCTIONAL CONDITIONS. IU. S. LETNIKOV. (AVTO. DELO. 1949, No. 5,p. 20) (In Russian) An account is given of the installation, with the aid of arc welding, of a flanged spherical tank, 3 m. in external diameter, with a 14-mm. wall, inside a welded column, during the reconstruction of an oil refinery. S.K.

VITENBERG, A.S.; BAKHSHIYAN, TS.A.; LEONTOVICH, V.Ye.; LETNIKOV, Yu.S.

Gas furnace for the heating of tubular blanks. Stal' 22 no.3:279 Mr '62. (MIRA 15:3)
(Furnaces, Heating--Patents)

DAVYDOV, P.D.; LETNIKOVA, V.B.

Acidophilus paste in the treatment and nutrition of infants. Vop. okh.mat. i det. 2 no.4:88 Jl-Ag '57. (MLRA 10:9)

1. Iz kliniki gospital'noy pediatrii Rostovskogo gosudarstvennogo meditsinskogo instituta.
(INFANTS--NUTRITION) (MILK, ACIDOPHILUS)

L 8523-65 EWT(d)/EEC(k)-2/EEC-4 Pg-4/Pk-4/Pl-4/Po-4/Pq-4 RAEM(a)/ESD(dp)/ESD(t)/RAEM(t)

ACCESSION NR: AP4045485 S/0109/64/009/009/1628/1633

B

AUTHOR: Letokhov, V. S.

TITLE: Measuring frequency fluctuation by a delay-line method

SOURCE: Radiotekhnika i elektronika, v. 9, no. 9, 1964, 1628-1633

TOPIC TAGS: frequency fluctuation, delay line, square law detector, signal detection

ABSTRACT: Measuring fluctuation of the frequency of oscillations by a delay-line method with the use of a square-law detector is theoretically considered. A correlation function of the detector-output signal is developed. The output-signal spectrum is described by a formula derived from a Wiener-Khinchin theorem; the formula holds true for any delay time (no limitation of the phase drift during the delay time is imposed). Defining the "optimum delay time" with certain qualifications, the selection of this optimum time is discussed. The applicability of

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L 8523-65
ACCESSION NR: AP4045485

2

some new formulas to laser structures is indicated. "I am taking this opportunity to express my deep gratitude to S. G. Rautian for his help and for discussing this work." Orig. art. has: 28 formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Institute of Physics, AN SSSR)

SUBMITTED: 05Jul63 ENCL: 00

SUB CODE: EC NO REF SOV: 005 OTHER: 002

Card 2/2

LETOKHOV, V.S.; VATSURA, V.V.; PUKHLIK, Yu.A.; FEDOTOV, D.I.; KOSOZHIKHIN, A.S.; ZHABOTINSKIY, M.Ye.; DASHEVSKAYA, Ye.I.; KOZLOV, A.N.; RUVINSKIY, L.G.; VASIN, V.A.; YURGENEV, L.S.; NOVOMIROVA, I.Z.; PETROVA, G.N.; SHCHEDROVITSKIY, S.S.; BELYAYEVA, A.A.; BRYKINA, L.I.; GLEBOV, V.M.; DRONOV, M.I., KONOVALOV, M.D.; TARAPIN, V.N.; MIKHAYLOVSKIY, S.S.; ZHEGALIN, V.G.; ZHABIN, A.I.; GRIBOV, V.S.; MAL'KOV, A.P.; CHERNOV, V.N.; RATNOVSKIY, V.Ya.; VOROB'YEVA, L.M.; MILOVANOVA, M.M.; ZARIPOV, M.F.; KULIKOVSKIY, L.F.; GONCHARSKIY, L.A.; TYAN KHAK SU

Inventions. Avtom. i prib. no.1:78-80 Ja-Mr '65. (MIRA 18:8)

L 51433-65

ACCESSION NR: AP5015513 UR/0286/65/000/008/0054/0054

AUTHOR: Letokhov, V. S. 26 B

TITLE: An electron optical transducer for spatial displacements of an image of a luminescent object. Class 42, No. 170171

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 8, 1965, 54

TOPIC TAGS: electron optics, transducer, spatial perception

ABSTRACT: This Author's Certificate introduces an electron optical transducer for spatial displacements of an image of a luminescent object. The device contains an objective lens, a color selective plate which projects an image of the objective onto two rotating cylindrical modulation lattices in the channel for the azimuth and angle of elevation, a sensing element and an electronic unit which analyzes the signals in each channel. The device is designed for giving information on displacement of the image of an object in the direction of propagation of the luminous flux (approach or withdrawal of the object or change in the focusing of the objective lens). The axis of rotation of one of the modulation grids is offset with respect to the geometric axis of the grid so that there is an additional amplitude modula-

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L 51433-65
ACCESSION NR: AP5015513

tion of the signal proportional in depth to the displacement of the image of the object.

ASSOCIATION: none

SUBMITTED: 04Aug62 ENCL: 00 SUB CODE: OP

NO REF SOV: 000 OTHER: 000

Card 2/2

L 56195-65
ACCESSION NR: AP5017804

UR/0286/65/000/011/0039/0039
53.082.52(082.2):
535.241.13(082.2):
621.397.3

22
B

AUTHOR: Letokhov, V. S.

TITLE: An electron-optical installation for determining the position of a luminous objects. Class 21, No. 171432

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 11, 1965, 39

TOPIC TAGS: electronic measuring device, electron optics, electronic measurement

ABSTRACT: This Author's Certificate introduces an electron-optical installation for determining the position of a luminous object, mainly for lab research. The unit contains a mirror for rotation of the image, a sensing element which reacts to variations in light flux depending on the position of the radiating object, and an electronic measuring circuit for processing the signal at the output of the sensing element. The working range of the instrument is expanded by mounting an absorption plate in front of the sensing element. The absorption factor of the plate varies

Card 1/3

L 56495-65

ACCESSION NR: AP5017804

parabolically from the center to the edges.

ASSOCIATION: none

SUBMITTED: 27Jul63 ENCL: 01 SUB CODE: EC

NO REF SOV: 000 OTHER: 000

Card 2/3

L 56195-65

ACCESSION NR: AP5017804

ENCLOSURE: 01

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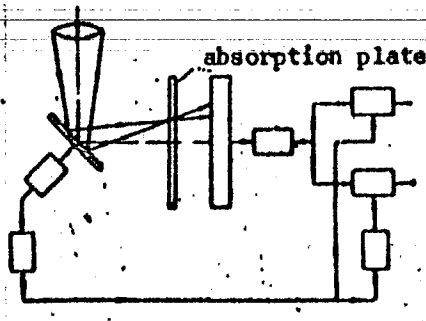

Fig. 1

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L 2686-66 EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h)/EWA(m)-2 SCTB/IJP(c)
WG

ACCESSION NR: AP5021139 UR/0386/65/002/001/0006/0009

AUTHOR: Basov, N. G.[44]; Letokhov, V. S.[44]

TITLE: Concerning atomic beam lasers [5,44]

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 1, 1965, 6-9

TOPIC TAGS: atomic spectroscopy, laser beam, optic transition, forbidden transition, spectral line, line intensity, line width

ABSTRACT: The authors examine the possibility of reducing the line width of a laser by using an atomic beam in a direction parallel to the front of the wave in the resonator. Since population inversion cannot be produced in this case by allowed optical transitions, they propose the use of the 180° pulse method, wherein the atomic beam passes through a light ray whose frequency equals the excitation frequency necessary for the atom to go over into a long-lived excited state. To avoid the difficulty raised by the possible deviation of the lasing frequency from the central transition frequency, the atomic beam is made to interact with the light beam generated by the laser itself. A diagram of such a laser is shown in Fig. 1 of the Enclosure. Its essential part is a quantum amplifier operating at the transition frequency. It is possible to use a semiconductor quantum amplifier in the case of Ca

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ACCESSION NR: AP5021139 2

and Sr beams, and an amplifier with an Nd^{3+}-doped crystal in the case of an Se beam. It is indicated in the conclusion that an atomic beam can also be excited by an intense spectral line from an incoherent source, such as the recently developed spectral lamps which emit intense intercombination lines of Ca, Sr, and other substances. [02]

Orig. art. has: 1 figure.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR) 44

SUBMITTED: 15May65	ENCL: 01	SUB CODE: EC, NP	
NO REF SOV: 003	OTHER: 004	ATD PRESS: 4102	

Card 2/3

L 2686-66

ACCESSION NR: AP5021139 ENCLOSURE: 01

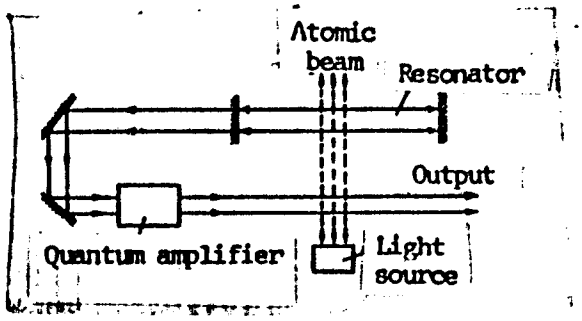

Fig. 1. Schematic diagram of atomic beam laser.

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L 22577-65 EWG(j)/EWA(k)/FBD/EWT(l)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(m)-2/EWA(h) Pn-4/Po-4/Pf-4/Peb/Pi-4/Pl-4 IJP(c) WG

ACCESSION NR: AP5003477 S/0181/65/007/001/0337/0339

AUTHOR: Basov, N. G.; Belenov, E. M.; Letokhov, V. S.

TITLE: Synchronization of oscillations in a semiconductor laser with several p-n junctions

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 337-339

TOPIC TAGS: laser, semiconductor laser, p n junction, stimulated emission, laser action, mode, resonator cavity, cavity resonator, standing mode

ABSTRACT: A theoretical analysis is conducted of the mode of operation of an injection laser consisting of an array of p-n junctions in which oscillations are synchronized in order to obtain larger power output and better directionality of laser emission. An electrodynamic model of a p-n junction as a dielectric waveguide with a low critical frequency in which there are only the lowest order standing waves E_{00} and H_{00} is used in deriving a formula for the internal coupling of the junction due to the penetration of the field. An expression is also derived for the external diffraction coupling coefficient by a method

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L 22577-65
ACCESSION NR: AP5003477

developed by N. G. Basov et al which is described in a paper yet to be published. External diffraction coupling of p-n junctions is obtained by making a hole in the face of the semiconductor and using an external mirror. The criteria for stability of the synchronized mode of operation are obtained by analyzing the oscillation equations of a system similar to that of two interacting lasers. Numerical estimates for a typical p-n junction show that synchronization of oscillations is more favorable in the case of external coupling. Orig. art. has: 5 formulas and 2 figures. [CS]

ASSOCIATION: Fizicheskiy institut imeni P. N. Lebedev (Physics Institute)

SUBMITTED: 02Nov64 ENCL: 00 SUB CODE: EC,GS

NO REF SOV: 002 OTHER: 002 ATD PRESS: 3172

Card 2/2

L 56478-65 EWA(l)/EWD/EWG(r)/EWT(l)/EWG(v)-2/EWG(t)/T/EWG(b)-2/EWP(k)/EWA(m)-2/
EWA(n) Pn-4/Pn-4/Po-4/Pf-4/Peb/Pi-4/Pl- SOTE/EJT(c) WG

ACCESSION NR: AP5015817 UR/0109/65/010/006/1143/1145
621.378.1:621.376

AUTHOR: Letokhov, V. S.

TITLE: Spatial effects in heterodyning of light waves

SOURCE: Radiotekhnika i elektronika, v. 10, no. 6, 1965, 1143-1145

TOPIC TAGS: heterodyning light wave, laser

ABSTRACT: The dependence of the beat amplitude on the angular difference between heterodyned waves is theoretically explored for various cases of noncoherent (ordinary light) and coherent (laser, TEM_{oo}) waves. In the case of plane waves, the beat amplitude depends on the wave polarization and is directly proportional to the area of the converter; two subcases of different and identical directions of waves are also considered. The case of spherical waves (a confocal-resonator laser) is similar to the planar case. Also, a formula for the beat amplitude is derived for TEM_{mn} and TEM_{pq} laser waves. "In conclusion,

Card 1/2

L 56478-65
ACCESSION NR: AP5015817

the author wishes to thank N. G. Basov and S. G. Rautian for their valuable comments, and also V. I. Bobrinev who showed me an inaccuracy in the mathematics of paragraph 3." Orig. art. has: 9 formulas. [03]

ASSOCIATION: Fizicheskiy institut AN SSSR (Institute of Physics, AN SSSR)

SUBMITTED: 24Aug64 ENCL: 00 SUB CODE: EC, OP

NO REF SOV: 000 OTHER: 006 ATD PRESS: 4035

Card 2/2

L 63963-65 EWA(k)/FBD/EWG(r)/EWT(1)/EPF(c)/EEC(k)-2/T/EEC(b)-2/EWP(k)/
EWA(m)-2/EWA(h) SCTB/IJP(c) WG/WW/GG

ACCESSION NR: AP5016177 UR/0051/65/018/006/1042/1046
621.375.9:535

AUTHOR: Basov, N. G.; Letokhov, V. S.

TITLE: Propagation of a light pulse in a medium with population inversion

SOURCE: Optika i spektroskopiya, v. 18, no. 6, 1965, 1042-1046

TOPIC TAGS: pulsed laser, pulse shape, laser optics, nonlinear optics, population inversion, ruby laser

ABSTRACT: Propagation of a light pulse is investigated in a medium with population inversion. Nonlinear distortions of the medium by a strong radiation pulse are taken into account. A nonlinear integral equation is derived which defines the limiting shape of a light pulse which passes a relatively great distance through the medium. Losses and degree of inversion of the induced radiation are taken into account in this equation. An expression is derived for the limiting energy of the pulse, and the nonlinear integral equation for the asymptotic shape of the pulse is solved numerically and plotted (see Fig. 1 of the Enclosure) for various ratios of loss factor to amplifi-

Card 1/3

L 63963-65

ACCESSION NR: AP5016177

cation factor per unit of length. The effect of ionization on inversion in a ruby is numerically evaluated by the authors in another work (N. G. Basov, V. S. Letokhov, "Reconance Interaction of a Radiation Pulse with an Inverse-Population Medium", *FIAN*, A-2, 1965). "The authors are grateful to V. S. Zuyev and A. N. Orayevskiy for useful discussions and to A. T. Matuchun for help with the calculations." Orig. art. has: 1 figure and 22 formulas. [14]

ASSOCIATION: none

SUBMITTED: 26Feb64 ENCL: 01 SUB CODE: EC

NO REF SOV: 000 OTHER: 004 ATD PRESS: 4071

Card 2/3

L 63963-65

ACCESSION NR: AP5016177

ENCLOSURE: 01

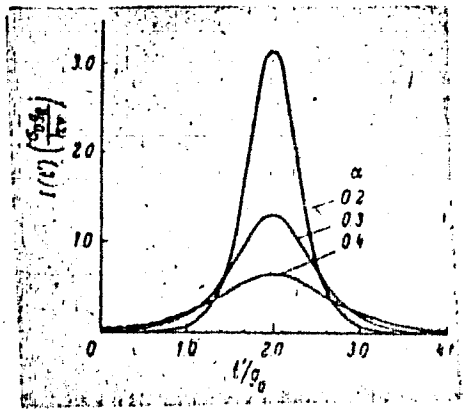

Fig. 1. Asymptotic shape of a light pulse in a medium with population inversion for various ratios of loss factor to amplification factor per unit of length $\alpha = \gamma/\sigma_0 n_0$

1 - 0.2; 2 - 0.3; 3 - 0.4.

Card 3/3

L 2530-66 EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h) SCTB/IJP(c) WG
ACCESSION NR: AP5022875 UR/0051/65/019/003/0465/0467
621.375.9:535

50
B

AUTHOR: Belenov, E. M.; Letokhov, V. S. 44
44

TITLE: Generation of highly directional coherent radiation

SOURCE: Optika i spektroskopiya, v. 19, no. 3, 1965, 465-467

TOPIC TAGS: laser, coherent radiation, stimulated emission, laser array
15

ABSTRACT: Generation of highly directional coherent radiation by an array of coupled lasers is discussed. The two methods described are based on the interference in the far zone of 1) coherent beams from several synchronized lasers (an arrangement for two lasers is shown in Fig. 1 of the Enclosure), and 2) coherent beams from reflecting surfaces (Fig. 2) of a single laser. In the first case the following three operating regimes are possible: a) synchronized generation by two lasers, b) independent operation of two lasers, and c) generation by one laser with a cavity in the shape of П. The results of an earlier paper (Akademiya nauk,SSSR. Doklady, v. 161, no. 3, 1965, p. 556) are used to obtain the criterion for the existence of the synchronized regime which can be achieved by using gas lasers. A similar analysis can also be conducted for more than two lasers. The coherent laser emission which interferes in

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L 2530-66
ACCESSION NR: AP5022875

the far zone forms highly directional maxima in certain directions. This is analogous to diffraction of a plane wave by a plane grid. In the case of several reflecting surfaces an analogous effect takes place in the far zone, except that the position of the maxima depends on the oscillation frequency. For this case the authors also give the criteria for directional stability. Orig. art. has: 4 formulas and 1 figure. [CS]

ASSOCIATION: none

SUBMITTED: 02Nov64 ENCL: 02 SUB CODE: EC

NO REF SOV: 003 OTHER: 000 ATD PRESS: 4108

Card 2/4

L 2530-66
ACCESSION NR: AP5022875

ENCLOSURE: 01

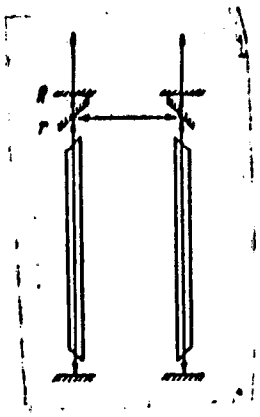

Fig. 1. Synchronization of two lasers

Card 3/4

L 2530-66
ACCESSION NR: AP5022875

ENCLOSURE: 02

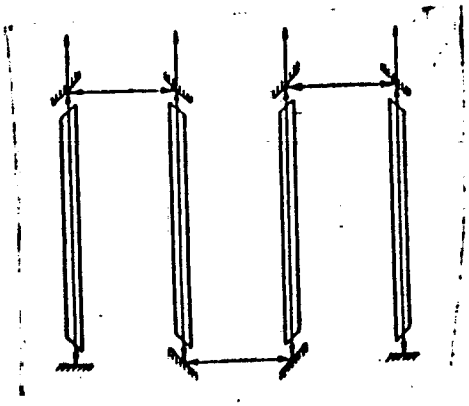

Fig. 2. Synchronization of a laser with several reflecting surfaces

Card 1/1

L 19885-66 EWT(1)/T IJP(c)
ACC NR: AP6007015 SOURCE CODE: UR/0051/66/020/002/0349/0350

AUTHOR: Letokhov, V. S.

ORG: none

TITLE: Photoionization of atoms in coherent states

SOURCE: Optika i spektroskopiya, v. 20, no. 2, 1966, 349-350

TOPIC TAGS: gaseous state maser, photoionization, coherent radiation, stimulated emission

ABSTRACT: The author considers single-quantum photoionization of an atom in a state which is a superposition of two states with close energies E_1 and E_2. It is shown that the probability for photoionization of an atom oscillates at a frequency

$$\Omega = \frac{(E_2 - E_1)}{\hbar}.$$

These probability oscillations remain valid in an assembly of noninteracting atoms in a common electromagnetic field with a frequency Ω_0 which makes the phenomenon coherent with respect to the assembly. This phenomenon of coherent photoionization

UDC: 535.212 + 537.56

Card 1/2

may be used in masers. It is shown that the process does not depend on the extent to which the ionizing light is monochromatic. The periodic change in the probability for photoionization of atoms may be used for producing a rarefied plasma with an electron and ion density which oscillates with a frequency Ω_0. Excitation in this plasma of an electromagnetic field with a frequency Ω_0 would result in coherent superposition of the two initial states of the atoms (polarization of the atoms on frequency Ω_0). Emission of electromagnetic waves is theoretically possible by placing a gas in a resonator tuned to a frequency Ω_0. It is shown that coherent photoionization could be most easily observed in vapors of alkali metals (Rb, Cs, etc.) which have a low ionization potential. "The author is sincerely grateful to N. G. Basov, O. N. Krokhin and I. I. Sobel'man for useful consultation and valuable remarks." Orig. art. has: 3 formulas. [14]

SUB CODE: 20/ SUBM DATE: 19May65/ ORIG REF: 003/ OTH REF: 003
ATD PRESS: 4217

L 44814-65 EWA(k)/FBD/EWG(r)/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/
EWA(m)-2/EWA(h) Pf-4/Pm-4/Pn-4/Po-4/Pi-4/Pl-4/Peb SCTB/IJP(c) WG
ACCESSION NR: AP5012044 UR/0057/65/035/005/0809/0812

AUTHOR: Letokhov, V. S.

TITLE: Diffraction losses of an open resonator whose mirrors contain absorptive stripe

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 5, 1965, 809-812

TOPIC TAGS: laser, coupling constant, diffraction loss, resonator loss, open cavity, resonator coupling, diffraction coupling, laser synchronization

ABSTRACT: Diffraction losses were calculated for an open resonator consisting of two infinitely long plane reflectors of width 2a separated by a distance L, the central band of width 2d of each of which is absorptive. The calculations were undertaken to obtain information concerning the diffraction coupling of open resonators; such information may be of practical importance in connection with the synchronization of lasers by diffraction coupling. The calculations were performed with an electronic computer for the TEM_{00} and TEM_{10} modes by the method of A.G.Fox and T.Li (Bell Syst. Techn. J., 40, 453, 1961). The parameter d/a was varied over its full range from 0 to 1, and calculations were performed for the values 1, 2.25,

Card 1/3

ACCESSION NR: AP5012044

and 4 of the Fresnel number $a^2/L\lambda$ (λ is the wavelength). The results are presented graphically as loss per traverse versus d/a. Relative field intensity distributions on the reflectors are also presented graphically for the TEM_{00} mode at a few separate values of d/a. For $a^2/L\lambda = 1$, the diffraction loss in the TEM_{00} mode increased rapidly with increasing d/a and became greater than the loss for an isolated resonator for d/a greater than about 0.12. The diffraction loss in the TEM_{10} mode increased less rapidly and remained smaller than the loss for an isolated resonator. For larger values of $a^2/L\lambda$ the TEM_{00} mode loss reached a sharp maximum followed by a deep minimum and became, for large d/a, approximately equal to the loss for an isolated resonator. It is concluded that synchronization of optical masers by diffraction coupling is possible because there exist conditions under which the loss from the coupled resonators is less than that from an isolated resonator.

"In conclusion, the author expresses his deep gratitude to N.G.Basov for valuable advice and discussions, to A.T.Matachun for assistance in the calculations, and to A.G.Molchanov for useful advice." Orig. art. has: 3 formulas and 7 figures. [02]

L 44814-65

ACCESSION NR: AP5012044

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva AN SSSR, Moscow (Physics Institute, AN SSSR)

SUBMITTED: 10Jul64 ENCL: 00 SUB CODE: EC

NO REF SOV: 002 OTHER: 001 ATD PRESS: 3256

mso

Card 3/3

L 54772-65 EWA(k)/FBD/EWG(r)/EWT(l)/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(h)/
EWA(m)-2 Pm-4/Pn-4/Po-4/Pf-4/Peb/Pi-4/Pl-4 SCTB/IJP(c) WG

ACCESSION NR: AP5015635 UR/0057/65/035/006/1098/1105

63
B

AUTHOR: Basov, N.G.; Belenov, E.M.; Letokhov, V.S.

TITLE: Diffraction synchronization of lasers

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.6, 1965, 1098-1105

TOPIC TAGS: laser, coupling constant, resonator, diffraction coupling

ABSTRACT: The authors calculate the diffraction coupling coefficient for two identical open resonators and derive conditions for the stable synchronous operation of diffraction coupled lasers. The calculations were undertaken because of their application to semiconductor lasers in which the working substance is deposited directly on the mirror and is separated into cells by absorbing partitions. The coupling coefficient for two open resonators with infinitely long reflectors of finite width operating in the TEM_{00} or TEM_{10} mode was calculated numerically for different values of the separation and the Fresnel number by the method of A.G.Fox and T.Li (BSTJ 40,453,1961). The results for

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L 54772-65
ACCESSION NR: AP5015635

Fresnel number 2.5 are presented graphically, and those for other Fresnel numbers are said to be similar. The coupling decreases so rapidly with increasing separation that in the case of many resonators it is only necessary to consider the coupling between nearest neighbors. Conditions for the stability of diffraction coupled lasers are deduced from the equations of A.N.Orayevskiy (Radiotekhnika i elektronika 4,718,1959) and V.M.Fayn (ZhETF 33,945,1957) by the method of Van der Pol. At some separations the stability conditions for both TEM_{00} and TEM_{10} oscillations are simultaneously satisfied. The present calculations do not show which is stable in this case. If resonators with Fresnel number 2.5 are separated by less than 4% of the width of the mirror, the TEM_{00} mode will be stable provided their lengths do not differ by more than approximately 2% of the wavelength. Orig.art.has: 23 formulas and 2 figures.

Card 2/3

L 54772-65

ACCESSION NR: AP5015635

ASSOCIATION: none

SUBMITTED: 24Aug64 ENCL: 00 SUB CODE: EC, EM

NR REF SOV: 010 OTHER: 002

Card 3/3

L 7708-66 EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h) SCTB/IJP(c)

ACC NR: AP5028331 SOURCE CODE: UR/0057/65/035/011/2126/2128

61

AUTHOR: Belenov, E. M.; Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut)

TITLE: On the theory of coupled lasers

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 11, 1965, 2126-2128

TOPIC TAGS: laser, laser synchronization, diffraction synchronization, laser coupling

ABSTRACT: Specific cases of the synchronization of several lasers and p-n junctions were described earlier by the authors with N. G. Basov (ZhTF, 25, 6, 1965; 25, 5, 1965, 809; FTT, 7, 337, 1965). In this letter to the editor of Zhurnal tekhnicheskoy fiziki, the authors report on the results of a theoretical investigation of a two-laser synchronization under more general conditions: different field amplitudes, delayed interaction, interaction through the active medium (apart from the resonator coupling), and permittivity dispersion. Orig. art. has: 10 formulas. [YK]

SUB CODE: EC/ SUBM DATE: 13Mar65/ ORIG. REF: 003/ ATD PRESS: 4140

Card 1/1

L 34937-65 EWG(j)/EWA(k)/FBD/EWT(l)/EWT(m)/EPF(c)/EEC(k)-2/EPF(n)-2/EI[illegible]/
EEC(t)/T/EWP(t)/EEC(b)-2/EWP(k)/EWP(b)/EWA(m)-2/EWA(h) Pm-4/Po-4/Pf-4/Pr-4/
Pe-4/Peb/Pi-4/Pu-4 IJP(c) WG/JD

ACCESSION NR: AP5006538 S/0056/65/048/002/0770/0771

AUTHOR: Letokhov, V. S.; Markin, Ye. P.

TITLE: On the statistics of radiation from a laser

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 2, 1965, 770-771

TOPIC TAGS: laser radiation, traveling wave laser, laser, stimulated emission, coherent light, ring laser

ABSTRACT: A procedure is described for the measurement of the amplitude probability density of the output of a laser to determine the deviation of the laser light from Gaussian light of thermal sources. The method consists in mixing two light signals with different frequencies and feeding the resultant beat frequency to an amplitude analyzer which measures the amplitude distribution. An experimental set-up is shown in Fig. 1 of the Enclosure. A traveling-wave ring laser was used as a source of two light oscillations with different frequencies but with matched fluctuations of the amplitude (neon-helium mixture). The rate of rotation was chosen

Card 1/3

L 34937-65
ACCESSION NR: AP5006538

such as to make the frequency difference between two oscillations approximately 2 kc. A typical result is also shown in Fig. 1. The results can be fitted to a distribution that corresponds to heterodyning of light oscillations having Gaussian amplitude fluctuations. "The authors thank N. G. Basov for support and valuable critical remarks, and B. I. Belov, V. V. Gromov, and V. V. Nikitin for help in developing and adjusting the apparatus." Orig. art. has: 2 figures and 3 formulas. [02]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

SUBMITTED: 07Dec64 ENCL: 01 SUB CODE: EC

NO REF SOV: 000 OTHER: 004 ATD PRESS: 3214

Card 2/3

L 34937-65
ACCESSION NR: AP5006538

ENCLOSURE: 01

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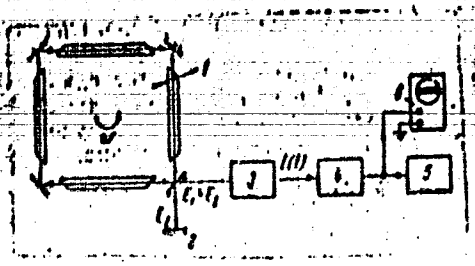

Fig. 1. Experimental setup

1 - Ring laser; 2 - mirror; 3 - photomixer;
4 - amplifier; 5 - pulse-height analyzer;
6 - oscilloscope.

Card 3/3

LETOKHOV, V.S.; MARKIN, Ye.P.

Statistics of the emission from a laser. Zhur. eksp. i teor. fiz. 48 no.2:770-771 F '65. (MIRA 18:11)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.

LETOKHOV, V.S.

The Kapitsa - Dirac effect. Usp. fiz. nauk 88 no.2:394-397 F '66.
(MIRA 19:3)

L 43120-65 EEC(b)-2/EWG(r)/EEC(k)-2/EWA(h)/EWA(k)/EWP(k)/EWT(1)/EEC(t)/
FBD/T/EWA(m)-2 Pf-4/Pi-4/Pl-4/Pn-4/Pn-4/Po-4/Peb IJP(c) WG
ACCESSION NR: AP5010571 UR/0020/65/161/003/0556/0559

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Belenov, E. M.; Letokhov, V. S.

TITLE: Diffraction synchronization of lasers

SOURCE: AN SSSR. Doklady, v. 161, no. 3, 1965, 556-559

TOPIC TAGS: laser, semiconductor laser, laser cavity, stimulated emission, laser array

ABSTRACT: A theoretical analysis is presented of the operation of a laser consisting of a cavity in which the active substance (a semiconductor film) is deposited directly on the reflectors. To suppress undesired oscillations in the plane of the active substance, the layer is split into separate isolated elements by absorbing partitions. The analysis is limited to the most desirable mode of operation, i. e., only the case of synchronized oscillations in the TEM_{00} and TEM_{10} modes is considered. The coefficients of diffraction coupling of open-cavity resonators are calculated, and the stability criteria for such an operating regime are established. The losses in the TEM_{00}

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L 43190-65
ACCESSION NR: AP5010571

and TEM_{10} modes were calculated by a numerical method developed by A. G. Fox and T. Lee. It is shown that when the diffraction coupling coefficient has negative values, coupled resonator cavity losses are smaller than the losses of an isolated cavity resonator. It is established that a stable mode of operation is that of the energetically most effective regime. Orig. art. has: 10 formulas and 1 figure. [CS]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

SUBMITTED: 06Aug64 ENCL: 00 SUB CODE: EC, SS

NO REF SOV: 006 OTHER: 002 ATD PRESS: 3242

Card 2/2

L 41810-65 EWA(k)/FBD/EWG(r)/EWT(l)/EWP(e)/EWT(m)/EEC(k)-2/EWP(i)/EEC(t)/T/EEC(b)-2/EWP(k)/EWA(m)-2/EWA(h) Pm-4/Pn-4/Po-4/Pf-4/Peb/Pi-4/Pl-4 IJP(c)
WG/WH
ACCESSION NR: AP5010825 UR/0020/65/161/004/0799/0801

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Belenov, E. M.; Letokhov, V. S.

TITLE: Maximum cross section of a laser beam 25

SOURCE: AN SSSR. Doklady, v. 161, no. 4, 1965, 799-801

TOPIC TAGS: laser, ruby laser, Q modulated laser, laser beam, beam size, CW laser, pulsed laser

ABSTRACT: Limitations imposed on the cross section of a laser beam are discussed. In CW laser resonators with large transverse dimensions, the size of the emitted beam can be restricted, in principle, by delayed interaction of the remote areas of the laser, or by detuning of the natural frequencies of the individual parts of the resonator. The delay effect, however, imposes no restrictions on the size of the generation area. Thus, when $\lambda \approx 1\ \mu$ and $\delta L \geq 1$ Å, $N_{max} \geq 800$. or when $L = 100$ cm the maximum width of the generation area was ≥ 5 cm. In pulsed (Q-modulated) lasers, the cross section is restricted when laser action occurs during a time of the same order as that required to set up modes in the resonator. The generation area in pulsed lasers can develop as the result of 1) the appearance and growth of separate, mutually-incoherent "streams" and 2) the confluence of adjacent

Card 1/2

L 41810-65
ACCESSION NR: AP5010825

2

streams with the establishment of the coherence. Thus, in a Q-modulated pulsed laser with L = 50 cm and $\lambda = 7 \cdot 10^{-5}$ cm, the generation area expanded in $\sim 10^{-8}$ sec to ~ 6 mm. In the case of a Q-modulated pulsed ruby laser with identical parameters, the area was 4 mm. Orig. art. has: 8 formulas. [YK]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

SUBMITTED: 24Nov64 ENCL: 00 SUB CODE: EC

NO REF SOV: 004 OTHER: 001 ATD PRESS: 3235

Card 2/2

L 4965-66 EWA(k)/FBD/EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/EWP(t)/T/EWP(k)/EWA(h)/EWA(m)-2
ACC NR: AP5027834 SCTB/IJP(c) WG/WH SOURCE CODE: UR/0020/65/165/001/0058/0060

AUTHOR: Basov, N. G. (Corresponding member AN SSSR); Ambartsumyan, R. V.; Zuyev, V. S.; Kryukov, P. G.; Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut, Akademiya nauk SSSR)

TITLE: Velocity of propagation of a powerful light pulse in a medium with population inversion

SOURCE: AN SSSR. Doklady, v. 165, no. 1, 1965, 58-60

TOPIC TAGS: laser, ruby laser, laser pumping, optic pumping

ABSTRACT: The article is a brief advance report of a comprehensive work to be published separately. It was shown that the leading edge of such a pulse does not change materially while propagating within a medium with inverse population. In the case of a ruby medium with usual parameters, the velocity of the pulse maximum on reaching its stationary value was shown to be 17 x 10^{10} cm/sec, which greatly exceeds the velocity of light. This fact, however, does not contradict the causality principle, since such a propagation takes place as the result of the deformation of the initially weak leading edge, and can continue only to the point of zero intensity which always propagates with the velocity of light in the medium. An amplifier composed of two ruby rods 24 cm long was used for experimental study of the problem. The end faces

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L 4965-66

ACC.NR: AP5027834 O

of the rods were cut at the Brewster angle. The total gain for a weak signal was about 50. Both input and output pulses were recorded by the same coaxial photocell arrangements, but the output pulse was made to travel an additional distance so that it reached the photocell 56×10^{-9} sec after the input pulse. The parameters of the input pulse were as follows: energy 1.3 J, pulse width 16×10^{-9} sec. A comparison of oscillograms of weak and strong pulses revealed that no appreciable shortening of the pulse occurred, and that only the time interval between the input and output pulse shortened as the pulse strength increased. The shift in the time interval in this case was 9×10^{-9} sec, which agrees with the theoretical considerations presented above. It follows that amplification of the exponentially growing leading edge of the pulse results not in a shorter pulse, but in an additional shift of the pulse peak. To shorten the pulse, it is necessary to increase the steepness of the leading edge by, say, cutting it off by a shutter, by nonlinear absorption, etc. It is noted further that the shift of the pulse peak with velocity exceeding the velocity of light is accompanied by the shift of the boundary of inverse population and can lead to the emergence of a number of new effects such as that of Cherenkov radiation. Orig. art. has: 1 figure and 2 formulas. [FP]

SUB CODE: EC, OP/ SUBM DATE: 31Jul65/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS: 4138

Card 2/2

L 21583-66 FBD/EWT(l)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG

ACC NR: AP6008754 SOURCE CODE: UR/0386/66/003/006/0261/0264

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Kryukov, P. G.; Letokhov, V. S. 42 B

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Laser with nonresonant feedback 25, 44

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 6, 1966, 261-264

TOPIC TAGS: laser r and d, ruby laser, laser beam, light scattering, laser optics

ABSTRACT: The authors report achievement of laser action with nonresonant feedback, produced by back-scattering from a volume or a surface, which behaves like a "stochastic" resonator with a continuous natural-frequency spectrum. The lasing frequency does not depend on the length of the resonator, but is determined by the resonant frequency of the active medium. In this laser (Fig. 1) the active medium comprised two

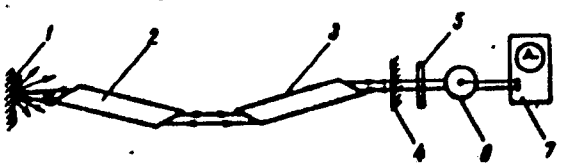

Fig. 1. Diagram of experiment. 1 - Scatterer, 2,3 - ruby crystal, 4 - mirror, 5 - filter, 6 - photocell, 7 - oscilloscope.

Card 1/3

L 21583-66

ACC NR: AP6008734

ruby crystals in series, each 24 cm long and 1.8 cm in diameter. The feedback was produced with the aid of a mirror (reflection 99%) and a volume scatterer (suspension of chalk particles in water) or surface scatterer (plate with a layer of sputtered MgO). The light was recorded with a photocell and oscilloscope, and its spectrum was measured with a Fabry-Perot interferometer. The gain of a weak signal in one passage through the two crystals reached 900. The condition of self excitation of the laser is described. The lasing threshold is found to be practically independent of the angle of inclination of the scatterer, over a wide range, but increases with increasing distance between the scatterer and the crystal. The radiation line width was smaller than 0.015 cm^{-1} and was determined by the resolution of the interferometer (the spontaneous emission line width of ruby is 15 cm^{-1}). An investigation of the beat radiation spectrum has shown that there are no frequencies characteristic of lasers with resonant feedback. The angle spread of the beam was proportional to the ratio of the crystal diameter to the average distance between the mirror and the scatterer. The distribution of the radiation field in the far zone was quite homogeneous. A pulse with duration 200 nsec was obtained in the case of Q-switching of the stochastic resonator. The average frequency of the generated radiation in the laser with nonresonant feedback was determined by the position of the center of the atomic transtiion, and not by the resonance of the feedback. It is consequently possible to produce an optical frequency standard on the basis of a laser with nonresonant feedback, using high-gain atomic transitions in a gas discharge (Ne, Xe, etc.) operating in the continuous mode, and also scatterers with narrow back-scattering directivity pattern.

Card 2/3

L 21583-66
ACC NR: AP6006754

It is noted that generation with feedback due to scattering by inhomogeneities of the crystal and by the matte side surface of the crystal can limit the maximum gain. [02]
Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 09Feb66/ ORIG REF: 002/ OTH REF: 003/ ATD PRESS: 4219

Card 3/3 UCR

L 21432-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG

ACC NR: AP6009485 SOURCE CODE: UR/0020/66/167/001/0073/0076

AUTHOR: Basov, N. G. (Corresponding member); Letokhov, V. S. 41

ORG: Physics Institute im. P. N. Lebedeva, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Change in the shape of a light pulse during nonlinear amplification

SOURCE: AN SSSR. Doklady, v. 167, no. 1, 1966, 73-76

TOPIC TAGS: laser, stimulated emission, nonlinear optics

ABSTRACT: A theoretical investigation is made of the change in the shape of a pulse from a laser during nonlinear amplification. The assumption is made that pulse duration is considerably longer than the transverse relaxation time of the medium. An expression is derived for the pulse velocity in such a medium as a function of the shape of the initial pulse. In the case of the exponential leading edge, this expression, which applies to the general case when the velocity pulse varies with the displacement of the pulse along the leading edge, reduces to the one derived by Basov et al. (AN SSSR, Doklady, v. 165, no. 1, 1965, p. 58). It is shown that it is possible to predict uniquely the change in the shape of the pulse of light during nonlinear amplification or even the shape of the ultrasonic pulse in a two-level phonon maser amplifier, if the shape of the initial pulse is known. Orig. art. has: 8 formulas and 3 figures. [CS]

SUB CODE: 20/ SUBM DATE: 26Nov65/ ORIG REF: 009/ OTH REF: 006/ ATD PRESS: 4221

Card 1/1 UDC: 621.375.9

L 24206-66 EWT(1)/T IJP(c) GG/WW/WG

ACC NR: AP6010998 SOURCE CODE: UR/0056/66/050/003/0765/0768

AUTHOR: Letokhov, V. S.

ORG: Physics Institute Im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Concerning the investigation of the statistical properties of incoherent light

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 3, 1966, 765-768

TOPIC TAGS: coherent light, laser application, Bose Einstein statistics, distribution function

ABSTRACT: The author calls attention to the possibility of studying experimentally the properties of incoherent light by making use of recently developed sources of coherent light. It is shown that by using the amplified spontaneous emission of radiation (super-radiation) from negative-temperature media, it is possible to measure the Bose-Einstein distribution photons in a quantum state. Since the statistics of super-radiation in sources without saturation are close to the statistics of equilibrium radiation, experiments for the measurement of the amplitude distribution function of incoherent light can be set up in the classical limit by heterodyning two light oscillations of different frequencies. Two possible experiments are described, one in which the amplitude fluctuations of the light oscillations are completely matched, and another in which the fluctuations are completely independent.

Card 1/2

ACC NR: AP6010998

In the former case a narrow spectral range can be separated with a long Fabry-Perot interferometer, and in the latter very narrow rays from two super-radiation sources can be used.. Arguments to support the feasibility of both experiments are presented. The author thanks N. G. Basov for a discussion and remarks. Orig. art. has: 1 figure and 8 formulas. [02]

SUB CODE: 20/ SUBM DATE: 12Oct65/ ORIG REF: 003/ OTH REF: 009/ ATD PRESS: 4245

Card 2/2 BLG

L 26070-66 EEC(k)-2/EWA(h)/EWP(k)/EWT(l)/FBD/T LIP(c) WG
ACC NR: AP6015807 SOURCE CODE: UR/0386/66/003/010/0413/0416

34
33
B

AUTHOR: Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Akademy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Autoresonant feedback in lasers 25

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 10, 1966, 413-416

TOPIC TAGS: laser r and d, refractive index, light reflection coefficient, quantum resonance phenomenon

ABSTRACT: The author considers the feasibility of producing optical lasers in which autoresonant feedback is realized by reflecting the light from a three-dimensional phase lattice produced in the medium by the laser's own light wave. Since the position of the resonance in such a laser is determined by the frequency of the maximum gain of the active medium, this research is of interest for the development of optical lasers with stable emission frequency. The manner in which three-dimensional periodic variation of the refractive index of the medium (phase lattice) in a standing light wave can be effected is discussed, and specific calculations are made for a lattice in liquid CS_2 and a ruby active medium ($\lambda = 7 \times 10^{-5}$ cm), using a dense mirror as the second reflection (Fig. 1). It is shown that a threshold gain $k \approx 10^{-3}$ per passage is perfectly attainable in gaseous active media, for example in Xe at $\lambda = 3.5$ μ.

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L 26070-66
ACC NR: AP6015807

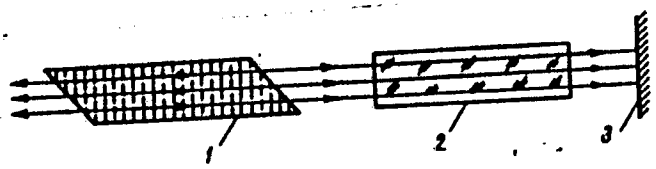

Fig. 1. Diagram of laser with autoresonant feedback: 1 -- three-dimensional phase lattice, 2 -- active medium, 3 -- mirror.

Other features of a laser with autoresonant feedback are a hard self-excitation mode (similar to a laser with an atomic beam) which is of interest for the development of optical lasers with stable radiation frequency, and the fact that three-dimensional phase lattices produced by the laser radiation field can also be used in ordinary lasers for the selection of axial modes. The author thanks N. G. Basov for a discussion of the problem. Orig. art. has: 1 figure and 2 formulas. [02]

SUB CODE: 20/ SUBM DATE: 25Mar66/ ORIG REF: 002/ OTH REF: 003/ ATD PRESS: 4252

Card 2/2 CC

L 27723-66 FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(h) IJP(c) WG

ACC NR: AP6014055 SOURCE CODE: UR/0056/66/050/004/1148/1155

AUTHOR: Letokhov, V. S.; Suchkov, A. F.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Generation dynamics of a giant coherent light pulse

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 4, 1966, 1148-1155

TOPIC TAGS: laser emission coherence, laser pulsation, laser theory, nonlinear effect, light pulse

ABSTRACT: A method developed by one of the authors (Suchkov, ZhETF v. 49, 1495, 1965) for the investigation of nonlinear nonstationary interaction of many modes in the presence of an inhomogeneous population inversion in the case of passive Q-switching laser processes in solids is employed in the present paper to study the space-time evolution of a giant light pulse from a Q-switched laser.[25] The calculation takes into account the essentially nonlinear and nonstationary interaction of many modes in the resonator of such a laser. It is shown by solving the space-time differential equations for the electric field in the resonator under the appropriate boundary and initial conditions that the observed giant pulse is the result of a superposition of a series of closely spaced pulses generated by neighboring regions in the laser. The influence of the inhomogeneous distribution of the population in-

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ACC NR: AP6014055

version density on the giant pulse structure is also investigated, and it is shown that the inhomogeneity of the distribution can greatly affect the waveform of the giant pulse. It is suggested that this inhomogeneity may be the cause of the second maximum observed in giant pulses by R. W. Hellwarth (Quantum Electronics, Proc. III Intern. Congress, Paris, 1964, v. 2, p. 1303). Orig. art. has: 5 figures and 12 formulas. [02]

SUB CODE: 20/ SUBM DATE: 20Nov65/ ORIG REF: 007/ OTH REF: 009/
ATD PRESS: 5001

Card 2/2 BLG

L 21840-66 EEC(k)-2/EWA(h)/EWP(k)/EWT(1)/FBD/T IJP(c) WG

ACC NR: AP6004913 SOURCE CODE: UR/0056/66/050/001/0023/0034

AUTHOR: Basov, N. G., Ambartsumyan, R. V., Zuyev, V. S., Kryukov, P. G., Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

51
B

TITLE: Nonlinear amplification of a light pulse 25

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 1, 1966, 23-34

TOPIC TAGS: laser, nonlinear optics, stimulated emission, quantum amplifier

ABSTRACT: A theoretical and experimental analysis is made of the passage of a powerful light pulse from a laser through a laser amplifier consisting of two ruby rods operating in a saturation regime. The preliminary experimental results have already been reported (Akademiya nauk SSSR. Doklady, v. 165, no. 1, 1965, p. 58-60 (see ATD Press, v. 4, no. 138, p. 7-8)). In the experiments performed, it was shown that as the result of nonlinear amplification the velocity of the pulse is 6—9 times greater than the velocity of light in vacuum. To decrease the pulse duration during nonlinear amplification, the slope of the incident pulse should be

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ACC NR: AP6004913 O

increased by chopping off the exponential leading edge of the pulse. By using a second Kerr cell, the duration of the pulse was shortened from 8.7 ± 0.5 nsec to 4.7 ± 0.5 nsec and the time from 3.7 ± 0.5 nsec to 1.9 ± 0.5 nsec. The theoretical analysis of nonlinear amplification predicts both of the observed effects. [CS]
Orig. art. has: 19 formulas and 8 figures.

SUB CODE: 20/ SUBM DATE: 31Jul65/ ORIG REF: 011/ OTH REF: 008

Card 2/2 nst

L 44732-66 EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(t)/ETI/EWP(k) IJP(c) WG/JD/JG

ACC NR: AP6031988 WH SOURCE CODE: UR/0386/66/004/005/0182/0185

AUTHOR: Zuyev, V. S.; Letokhov, V. S.; Senatskiy, Yu. V.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Giant superluminescence pulses

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 5, 1966, 182-185

TOPIC TAGS: laser application, luminescence, neodymium glass, stimulated emission/ KGSS-7 neodymium glass

ABSTRACT: The authors report a study of giant pulses of superluminescence of a strongly excited neodymium-glass medium with rapid switching of the gain. The reason for the use of giant pulses of incoherent light is that experiments with giant pulses of coherent and incoherent light can disclose the role of coherence and the role of optical power in the case of interaction of light with matter and the mechanism of damage to transparent materials by a strong light field. The tests were made with an active medium (Fig. 1) consisting of two identical neodymium-glass rods (KGSS-7) of 10 mm diameter, with matte lateral surfaces and with butt ends cut at the Brewster angle. The pump lamps illuminated 900 mm of the lateral surface of the rods. The gain in the two pumped rods was of the order of 10^4 per pass. The gain was instantaneously increased to 10^8 by uncovering the dense mirror with a Kerr shutter. The pulses radiated by the

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ACC NR: AP6031988

Fig. 1. Diagram of setup for obtaining and recording giant superluminescence pulses. 1 - Dense mirror, 2 - Kerr shutter, 3 - neodymium-glass rods, 4 - filter, 5 - coaxial photocell.

medium at $K \simeq 10^8$ had an approximate energy 4 J and a duration at half-maximum 9 - 12 nsec. The start of the pulses lagged the time of gain switching t_1 by 25 - 30 nsec. The medium was thus de-excited within less than three passes, the main energy being radiated within a time shorter than T_0. The power of the obtained superluminescence pulses reached 500 MW/cm^2. Several intense flashes damaged the output end of the rod at the point A (Fig. 1). Thus, self-damage of neodymium glass is possible under the influence of intense incoherent radiation. The authors thank N. G. Basov for support and a discussion of the work. Orig. art. has: 2 figures and 1 formula.

SUB CODE: 20/ SUBM DATE: 17Jun66/ ORIG REF: 001/ OTH REF: 003

Card 2/2 mjs

L 47575-66 EEC(k)-[illegible]

ACC NR: AP6032467 SOURCE CODE: UR/0056/66/051/003/0724/0729

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Kryukov, P. G.; Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Laser with a nonresonant feedback

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 3, 1966, 724-729

TOPIC TAGS: solid state laser, ruby laser, nonresonant feedback, laser r and d

ABSTRACT: A description is given of a pulsed laser with a nonresonant feedback achieved by back scattering of radiation (See also FSB, v. 2, no. 5, 1966, 1—6). The arrangement used in the experiments is shown in Fig. 1. The active medium

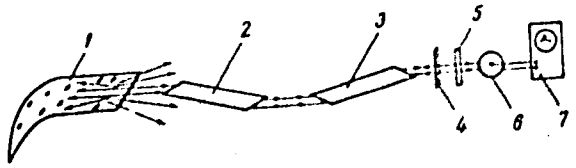

Fig. 1. Experimental arrangement

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ACC NR: AP6032467

consists of two ruby rods, 2 and 3, each 24 cm long and 1.8 cm in diameter with the ends cut at the Brewster angle. The feedback is achieved by means of mirror 4 (70% reflective) and a volume or surface scatterer 1. The volume scatterer consists of sulfur hydrosol particles with diameters not less than the laser wavelength which are placed in a 15-cm-long cell with Brewster angle windows. The surface scatterer is a layer of magnesium oxide sputtered onto an aluminum plate. The rest of the experimental setup consists of a filter 5, a photocell 6, and an oscillograph or Fabry-Perot interferometer 7. Experiments indicate that varying the inclination angle of the scatterer between 0 and 60° has virtually no effect on the oscillation threshold, which was observed to increase with distance between the scatterer and the crystal. The spatial coherence length of the nonresonant feedback laser does not exceed 0.25 mm. The laser emission is highly monochromatic and the frequency of radiation is independent of the cavity dimensions. The line narrowing (to 0.005 cm^{-1}) above the threshold for laser action depends on the resonant properties of the active medium. This property makes such a laser a reliable optical frequency standard. For this purpose it is preferable to use mixtures of gases such as Xe, Ne-He, etc., as active media to provide a high gain per pass and a cw operation. Orig. art. has; 1 figure and 4 formulas. [YK]

SUB CODE: 20/ SUBM DATE: 21Mar66/ ORIG REF: 003/ OTH REF: 005/ ATD PRESS: 5093

Card 2/2

L 44793-66 EWT(1)/EWP(e)/EWT(m)/EEC(k)-2/T/EWP(k) IJP(c) WG/WH

ACC NR: AP6031433 SOURCE CODE: UR/0056/66/051/002/0406/0411

55
B

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Zuyev, V. S.; Kryukov, P. G.; Letokhov, V. S.; Shatberashvili, O. B.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: The structure of a giant pulse of a Q-switched laser 75

SOURCE: Zh eksper i teor fiz, v. 51, no. 2, 1966, 406-411

TOPIC TAGS: solid state laser, ruby laser, giant pulse laser, Q switched laser, laser output

ABSTRACT: The spatial and temporal development of a giant pulse of a Q-switched ruby laser in a transverse direction and the effects of the cavity on it were investigated experimentally by means of the setup shown in Fig. 1. A ruby rod 9 mm in diameter and 120 mm long with dull lateral surfaces was placed in a reflector with a helical IFK-15000 flashlamp. For an 8-kj pump the gain per pass was approximately 12. A 1.5-j single laser pulse was generated with a duration of 10—15 nanosec. Q-switching was done by means of a Kerr cell or a vanadium phthalocyanin solution. The exponential results indicate that generation commences in the center of the crystal and spreads transversely over the entire crystal in 3—10 nanosec, i.e., in a time comparable to the duration of the integral pulse. The spatial development of generation

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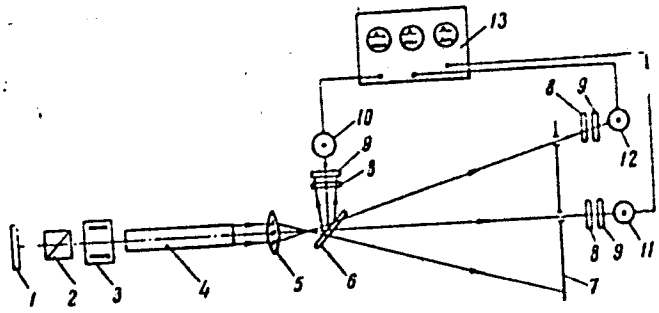

Fig. 1. The experimental setup

1 - Mirror 99% reflective; 2 - polarizer; 3 - Kerr cell; 4 - ruby crystal; 5 - lens; 6 - semitransparent plate; 7 - screen with diaphragms; 8 - interference filter; 9 - dull glass; 10-12 - coaxial photocells; 13 - multibeam oscillograph.

depends essentially on the density distribution of population inversion in the crystal and on its refractive index. The experimental data agree fully with theoretical data presented elsewhere (V. S. Letokhov and A. F. Suchkov, ZhETP, 50, 1966, 1148). The authors propose further experiments on the measurement of nonuniformity of the complex permittivity at the instant of Q-switching and generalization of the theory for the case of a nonuniform refractive index. Orig. art. has: 7 figures. [YK]

SUB CODE: 20/ SUBM DATE: 06Mar66/ ORIG REF: 007/ OTH REF: 006/ ATD PRESS: 5080

L 60674-67 EWT(l)/EWP(e)/EWT(m)/EWP(j) IJP(c) WG/WW/GG/RM/WH

ACC NR: AP6023635 SOURCE CODE: UR/0386/66/004/001/0019/0022

AUTHOR: Ambartsumyan, R. Vl; Basov, N. G.; Zuyev, V. S.; Kryukov, P. G.; Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Propagation of a light pulse in a nonlinearly amplifying and absorbing medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 1, 1966, 19-22

TOPIC TAGS: coherent light, light pulse, laser beam, laser r and d, pulse shape, ruby optic material

ABSTRACT: This is a continuation of earlier work by the authors (ZhETF v. 50, 23, 1966), where propagation of coherent light in a medium with nonlinear gain was investigated and the possible shortening of light pulses in such a medium predicted. The present letter reports on successful experiments in this direction, showing that to obtain compression of a propagating light pulse it is necessary to eliminate the transverse structure that is produced in the light pulse when the latter is produced, for example, by a Q-switched laser. In the test setup (Fig. 1) the amplifying component consisted of three ruby crystals and the absorbing component was two cuvettes filled with a solution of vanadium phthalocyanine in toluene. In the initial experiments the pulse compression could not be realized because of the transverse structure resulting

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L 00674-67

ACC NR: AP6023635

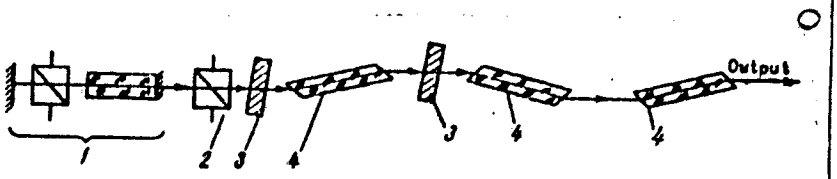

Fig. 1. Diagram of experiment. 1 - Laser, 2 - Kerr shutter, 3 - cuvette, 4 - ruby crystal

from the fact that the development of pulse generation in the peripheral parts of the crystal is delayed by a time of the order of the pulse duration. Success was attained when this structure was eliminated by means of a second Kerr shutter that cut off the leading front of the generator pulse. The pulse width was reduced from about 11 nsec (at 0.5 J energy) past the Kerr shutter and the first absorbing cuvette to 5.7 nsec (10 J) past the second amplifying crystal, and 2 nsec (15 J) past the third. A light output of 7 - 8 GW (3 GW/cm^2) was attained. The pulse power is much higher than the power causing damage in ruby crystals at 10^{-8} sec duration (1 GW/cm^2). Although damage to the crystal is hindered by the short duration of the pulse, it does not prevent generation of powerful light pulses shorter than 10^{-9} sec. It is concluded that extremely short light pulses are obtainable with two-component media in which the absorbing component has a saturation energy much lower and a homogeneous line width much larger than the amplifying medium. Orig. art. has: 2 figures. [02]

SUB CODE: 20/ SUBM DATE: 03May66/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS: 5037

Card 2/2 vlr

ACC NR: AP7001347 SOURCE CODE: UR/0386/66/00[illegible]

AUTHOR: Letokhov, V. S.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Stimulated radio emission of the interstellar medium

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v [illegible]aktsiyu. Prilozheniye, v. 4, no. 11, 1966, 477-481

TOPIC TAGS: radio emission, cosmic radio source, maser, interstellar matter, cosmic dust, coherent scattering

ABSTRACT: To explain some anomalies recently observed in the radio emission of the OH molecule in the interstellar medium, the author demonstrates that radio emission can not only be coherently amplified by the interstellar medium, as proposed recently in the literature, but can actually be coherently generated there as a result of feedback produced in scattering by free electrons or cosmic dust particles. The properties of such a "cosmic maser" differ appreciably from the properties of a "cosmic maser amplifier," and this accounts for the observed anomalies. The back scattering coefficients for highly ionized hydrogen, Thomson scattering by electrons, and scattering by cosmic dust are estimated. It is shown that in addition to the lower efficiency of feedback by dust particles compared with feedback by electrons, there is another essential difference between the two. In the latter case, strong broadening of the emission spec-

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ACC NR: AP7001347

trum accompanies the back scattering, so that the spectrum narrowing takes place only in one passage through the generation region. In the former case, the scattering dust particles are not turbulent and the required spectrum narrowing takes place only after many passages through the generation region. The anomalies in the radio emission of OH can be explained by assuming that the radio-emission sources can operate in the generation mode. The role of such generation can also be assessed by observing the electron and cosmic dust intensity in the anomalous-emission sources, the time dependence of the emission intensity, and other factors. The author thanks N. G. Basov, G. A. Askar'yan, and A. G. Molchanov for a discussion of the problem and valuable remarks. Orig. art. has: 4 formulas.

SUB CODE: 20, 03/ SUBM DATE: 21Oct66/ ORIG REF: 004/ OTH REF: 005/
ATD PRESS: 5108

Card 2/2

ACC NR: AP7001314 SOURCE CODE: UR/0057/66/036/012/2181/2187

AUTHOR: Letokhov, V. S.; Pavlik, B. D.

ORG: Physics Institute im. P. N. Lebedev, AN SSSR, Moscow (Fizicheskiy institut AN SSSR)

TITLE: The nonlinear amplification of a surface wave in an active optical waveguide

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 12, 1966, 2181-2187

TOPIC TAGS: nonlinear optics, wave propagation, optical waveguide, fiber optics, glass fiber

ABSTRACT: A theoretical study was made of the propagation of a surface light wave in an optical glass fiber whose core and envelope are activated with paramagnetic ions which, respectively, amplify and absorb the wave at the same frequency. In such fibers, if saturation of absorption (bleaching) occurs before saturation of amplification, the leading edge of the pulse is absorbed by the fiber envelope, the remainder of the pulse being amplified by the fiber core. As a result, pulse length decreases (to 10^{-10} sec) and its power increases (to 10^{10} w/cm^2). It was shown that in an infinite two-component waveguide an energy threshold exists for all modes propagated therein, below which modes are attenuated due to the saturation of resonance absorption. The described waveguide can be used to considerably decrease the excitation

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