MERKULOV, I., konstruktor

Soviet planet. Kryl.rod. 10 no.3:8-9 Mr '59.

(MIRA 12:4)

1. Predsedatel' nauchno-tekhnicheskogo komiteta reaktivnoy tekhniki
TSentral'nogo aerokluba SSSR im. V.P. Chkalova.
        (Space flight)   (Artificial satellites)

PHASE I BOOK EXPLOITATION   SOV/3608

Merkulov, Igor' Alekseyevich, Deputy Chairman of the All-Union
Section on Astronautics of the USSR Federation of Aviation Sport

Polet raket k Lune (Rocket Flight to the Moon) Moscow, Izd-vo
"Znaniye," 1960. 31 p. (Series: Vsesoyuznoye obshchestvo po
rasprostraneniyu politicheskikh i nauchnykh znaniy. Ser. 4,
vyp. 1, Nauka i tekhnika) 60,000 copies printed.

Ed.: T.F. Islankina; Tech. Ed.: Ye.V. Savchenko.

PURPOSE: This booklet is intended for the general reader interested
in space exploration and travel.

COVERAGE: The booklet gives basic data on space travel and rocket
propulsion, and some specific data on the launching of the Soviet
moon rocket on September 12, 1959. Two references, both Soviet,
appear in footnotes.

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AVAILABLE: Library of Congress

Card 2/2   AC/jb
                                                              5-24-60

AUTHOR: Merkulov, I., Deputy Chairman of the All-Union Section of Astronau-
             tics of the Aviation Sport Federation of the USSR

TITLE: Ways to the Cosmos Open Up

PERIODICAL: Kryl'ya rodiny, 1960, No. 9, p. 4

TEXT: In its essence this article is a general propagandistic glorifica-
tion of Soviet achievements in launching cosmic rockets, beginning with the first
Soviet Earth satellite (Sputnik I). The main portion of the article deals with
the second Soviet cosmic vessel launched on August 19, 1960, that contained two
dogs, 40 mice, two rats, insects, plants, seeds and some germs. The importance
of scientific results obtained by this rocket vessel is emphasized as a prerequi-
site for successful space travel of man in the near future. The article stresses
the impeccable functioning of this vessel's equipment, as a great success of So-
viet scientists, who are said to have successfully solved the problems of rocket
engineering (development of suitable rocket fuel, heat protection, flight control
equipment, etc.). The importance of successful recovery of the capsule contain-
ing dogs, etc. is also emphasized. A hope is expressed that before long human
beings will be able to man space ships to the moon, Mars and Venus.
Card 1/1

26(5) 26.5000

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SOV/29-60-1-15/25

AUTHOR: Merkulov, I.

TITLE: From Step to Step

PERIODICAL: Tekhnika molodezhi, 1960/ Nr 1, pp 18-23 (USSR)

ABSTRACT: In this article the author deals with multistage rockets. For
               the purpose of attaining cosmic velocities, K. E. Tsiolkovskiv
               had once suggested the so-called "rocket train", which, in
               principle, corresponds to a modern multistage rocket. The func-
               tioning of such a rocket is described. If the rocket is intend-
               ed to land on another planet and to return to the Earth, the
               last part of the rocket must also consist of several stages,
               which are put in operation, one after the other, for another
               start. The more stages a rocket has, the less fuel reserves are
               necessary, and the total weight of the rocket is reduced. For
               a flight to other planets, the rocket must carry additional
               fuel reserves besides the fuel necessary for launching, in
               order to be able to damp the second cosmic velocity developed
               within the range of attraction of the respective planet. On
Card 1/3   pp 20-21 a section through a 5-stage rocket is shown. This

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From Step to Step

SOV/29-60-1-15/25

rocket is intended to convey a container weighing 1 t and containing scientific instruments to the Moon. Technical data from scientific literature (e.g. the books by V. Fedos'yev and G. Sinyarev: "Vvedeniye v raketnuyu tekhniku" (Introduction Into Rocket Engineering) and by Sutton "Raketnyye dvigateli" (Rocket Motors) served as a basis for calculation. For an exhaust velocity of the first stage of 2,400 m/sec the following weights were determined: Starting weight 3,348 t, comprising 2,892 t of fuel, 455 t constructions, and 1 t useful load. The weight of the individual stages was: 1) 2,761 t, 2) 495 t 3) 75.5 t, 4) 13.78 t, 5) 2.72 t. The rocket is 60 m high, and the diameter of the lowest stage is 10 m. The 1st stage has 19 engines each having a tractive power of 350 t. The 2nd stage has 3 engines of the same power. The 3rd stage has 3 engines a tractive power of 60 t each. The 4th stage has 1 engine with 35 t, and the last stage 1 engine with 10 t tractive power. The engines of the 1st stage give the rocket a speed of 2 km/sec at the start. After the first stage is discarded, the engines of the 3 following stages are put in

Card 2/3   operation until the rocket attains the second cosmic velocity,

From Step to Step

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SOV/29-60-1-15/25

after which it continues its flight mechanically. Near the
Moon the rocket turns round with its jets pointing to the
surface of the Moon. The engines of the 5th state are switched
in and reduce speed of fall. The figure and the calculations do
not represent an actual project of a Moon rocket. They are only
intended to convey an approximate idea of the dimensions of a
cosmic multistage rocket. Gradually, atomic energy will be used
instead of chemical fuels. This will entail the production of
new types of engines, which, in turn, will give rise to complete
changes in rocket construction. There are 8 figures.

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S/085/60/000/02/004/040
DOC1/DOC3

AUTHOR: Merkulov, I.

TITLE: Dead on Target!

PERIODICAL· Kryl'ya rodiny, 1960, Nr 2, p 2 (USSR)

ABSTRACT: The author describes the firing of two Soviet multi-
             stage ballistic rockets, intended to test the quality
             and accuracy of their control mechanism and to try
             out a number of unspecified instruments. The tar-
             get area was a 300 x 500 km rectangle in the Pacific
             Ocean and the first launching took place on 20 Janu-
             ary 1960. Throughout the flight data was radioed
             to land and marine stations. The penultimate and
             last stages developed a speed of over 26,000 km/h.
             The target area was reached at 2005 hours Moscow
             time on the day of launching and the nose-cone en-
             tered the sea 12,500 km from the firing point and

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D001/D003

Dead on Target!

less than 2 km from the calculated point of impact.
Ships of the Soviet fleet were standing by and took
telemetric data on the downward trajectory. The
last stage of the rocket was designed to pass through
the denser atmospheric layers without burning up and
was observed on impact by radar, optical and acoustic
ship-board stations. The penultimate stage re-en-
tered dense atmosphere at an altitude of 80-90 km and
was later destroyed after partial burning up. At
1958 hours MT on 31 January 1960 the cone and pen-
ultimate stage of the second rocket landed accurate-
ly on target. According to Academician S. Sobolev
these and similar tests are designed to facilitate
the launching of Earth satellites and, later, inter-
planetary rockets. There is 1 drawing.

Card 2/2

PHASE I BOOK EXPLOITATION   SOV/5687

Pokrovskiy, Georgiy Iosifovich, Petr Kuzmich Isakov, Igor' Alekseyevich Merkulov,
  and Vladimir Vasil'yevich Dobronravov

Put' v kosmos (Road to Space) Moscow, Izd-vo "Znaniye," 1961. 44 p.
  (Series: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i
  nauchnykh znaniy. Seriya IV, 1961: Tekhnika, no. 13) 40,000 copies printed.

Ed.: T. F. Islankina; Tech. Ed.: L. Ye. Atroshchenko.

PURPOSE: This booklet is intended for general readers.

COVERAGE: This is a collection of 4 popular-type articles in which some data
  on Yu. A. Gagarin's space flight are given and fundamentals of space flights
  are discussed. Several diagrams of satellite trajectories are given, and
  three photos of Gagarin and of a man in weightlessness test appear in the
  text. No personalities are mentioned. There are no references.

Card 1/2

Road to Space   SOV/5687

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AVAILABLE: Library of Congress

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AC/rn/mas
10-17-61

MERKULOV, I.

Deed of a revolutionary scientist. Kryl.rod. 12 no.7:19-20 Jl '61.
(MIRA 14:6)

(Kibal'chin, Nikolai Invanovich, 1854-1881)

22367

S/029/61/000/006/003/004
D045/D112

3.9900

AUTHOR: Merkulov, I.A., Engineer

TITLE: Paths of Spaceships

PERIODICAL: Tekhnika molodezhi, no. 6, 1961, 20-22

TEXT: The author briefly reviews basic theoretical considerations for
launching a spaceship on a circular orbit by means of a multi-stage rocket,
which raises the ship to the required altitude and gives it a first escape
speed, horizontal to the Earth's surface. This speed, which is 7,790 m/sec
at an altitude of 200 km, should be equal to 1 km/sec at an altitude equal
to the distance between the Earth and moon. In a case where the speed im-
parted to the space vehicle is greater than the circular speed, the vehicle
will begin to move on an elliptical orbit. A spaceship starting free flight
at an altitude of 200 km, at a speed of 11 km/sec, will reach the moon's
orbit at the apogee. A spaceship, starting free flight at an angle to the
horizon, will continue flight on an elliptical orbit even at circular speed.
The paths of two spaceships, starting free flight at 400 km altitude and
travelling at the same speed, are represented in fig. 1. The vehicle travel-

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D045/D112

Paths of Spaceships

ling horizontally will make a circular orbit; the other, travelling at an
angle to the horizon, will start climbing while its flight speed will be
decreased. In the apogee, this speed will be 7449 m/sec. At this height,
the ship can no longer continue circular movement owing to insufficient speed.
On descent, the speed increases, not quite reaching 7,902 m/sec in the peri-
gee. However, this speed is more than the circular speed for the given
height and therefore the ship will fly on an elliptical orbit and will once
more gain height. Both orbits differ but have common features; the sum of
the altitudes of the perigee and the apogee in the elliptical orbit is equal
to double the altitude of the circular orbit. Consequently, both ships
circle the Earth in exactly the same time - 92 min 29 sec. These laws are
applicable to the flight of any spaceship. Four satellites launched at an
altitude of 35,810 km, with a first escape speed, will complete a full revo-
lution in 24 hrs; due to the various directions of their flights, their
orbits (fig. 2) will differ. The "Vostok" spaceship, with Yu.A. Gagarin on
board, travelled on an elliptical orbit (fig. 4) at altitudes of 181 and
327 km in the perigee and apogee respectively. The speeds attained in this

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Paths of Spaceships

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case were 7,843 m/sec at the perigee and 7,671 at the apogee. Dealing with
the deceleration of spaceships on approach to Earth, the author emphasizes
the complexity of the problem of reasonably determining the weight of fuel
in relation to the total weight of the spaceship. The ship has to be of the
lightest possible construction with a preponderance of weight allotted to
fuel. When reducing the escape speed by 1,000 m/sec, fuel consumption may
amount to approximately 25 to 50% of the weight of the ship. To ensure that
the ship is landed safely, it is necessary to slow down its speed of impetus
to a speed at which it can safely pass through the atmosphere. Complicated
problems of design have to be taken into consideration. Much fuel has to
be expended in order to allow the ship to easily pass through the atmosphere
at a reduced speed. If the speed cannot be sufficiently reduced, it is ne-
cessary to protect the ship from destructive heating by installing a thick,
heat-proof ceramic layer or a complicated cooling system. The main task
facing spaceship designers, says the author, is the designing of a ship
equipped with the minimum weight of landing devices. Air resistance has
also been considered as a braking medium, involving the use of parachutes
or similar equipment. In his concluding remarks, the author prophesies that
the first manned orbital space trip will be followed by flights to other
planets of the solar system. There are six figures.
Card 3/5

S/C°5/62/CCC/C1C/CC1/CC1
DC36/E113

AUTHOR: Merkulov, I., Chairman of the Committee (see ASSOCIATION)

TITLE: The trajectories of space ships

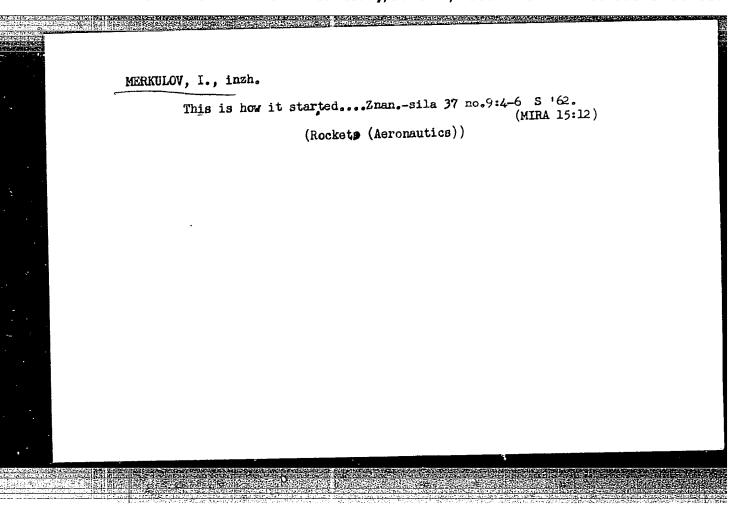PERIODICAL: Kryl'ya rodiny, no. 10, 1962, 4-5

TEXT: The author, using the flights of "Vostok-3" and "Vostok-4" as an example, briefly explains how a spaceship's orbital velocity and altitude and flight direction at the end of the active phase influence its orbital trajectory. There is 1 figure.
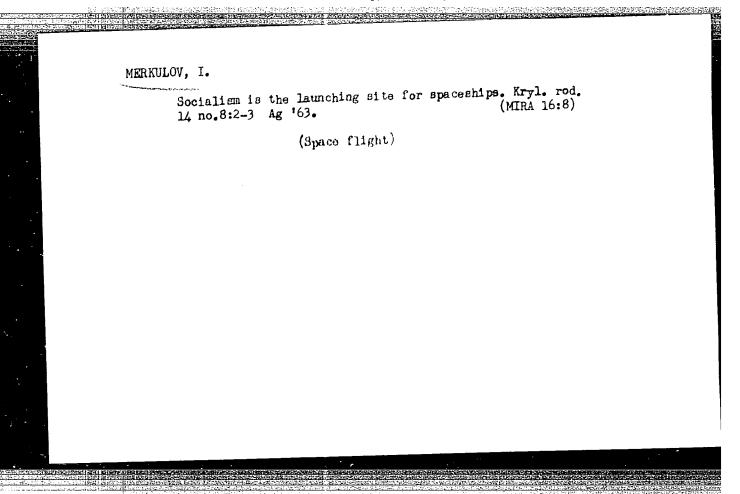
ASSOCIATION: Nauchno-tekhnicheskiy komitet raketnoy tekhniki sektsii astronavtiki Federatsii aviatsionnogo sporta SSSR (Scientific and Technical Committee on Rocketry of the Astronautics Section of the Federation of Aviation Sport USSR)

Card 1/1

MERKULOV, I., inzh.

This is how it started....Znan.-sila 37 no.9:4-6 S '62.
(MIRA 15:12)

(Rockets (Aeronautics))

MERKULOV, I.

Socialism is the launching site for spaceships. Kryl. rod.
14 no.8:2-3 Ag '63.   (MIRA 16:8)

(Space flight)

KAZNEVSKIY, V., inzh.; MERKULOV, I., inzh.; FATKIN, Yu., inzh.

Screen of a photon engine. Av.i kosm. 45 no.2:14-21 F '63.

(MIRA 16:2)

(Space vehicles—Nuclear power plants)

L 16644-65
FS(v)-3/EEC(j)/EEC(k)-2/EEC(r)/EWP(f)/EWP(h)/FSS-2/EWG(r)/EWT(1)/EEC(a)/EWP(m)/EWG(k)/
EPA(bb)-2/EWG(c)/EWA(m)-2/FS(b)   Pb-4/Pa-6/Po-4/Pd-1/Pab-10/Pe-5/Pq-4/Pac-4/
Pf-4/Pg-4/Ps-4/Pae-2/Pi-4   IJP(c)/ESD(dp)/RAEM(c)/ESD(si)/ESD(t)/AEDC(a)/
ACCESSION NR: AP5000086 AEDC(b)/SSD/BSD/AFWL/ASD(a)-5/6/0085/64/000/011/0004/0005
                           AFMD(c)/AFTC(b)/AFTC(a)/AFETR   JWA/TT/BW/WW/GW

AUTHOR: Merkulov, I. A.

TITLE: The solar sail

SOURCE: Kryl'ya rodiny, no. 11, 1964, 4-5

TOPIC TAGS: solar sail, spacecraft, interplanetary travel

ABSTRACT: At the International Congress of Astronautics that met at Warsaw in
September, considerable interest was aroused by reports on the use of solar rays
for space flight. The author discusses this important problem. The idea has been
worked on for some time, but powerful rockets are needed for the start from the
earth or from any planet to overcome gravity. When a ship is in orbit, however, a
solar sail may be used for flight power. At a distance of 150 000 000 km from the
sun, each square meter of sail will be acted on by a force of as much as 1 dyne.
Since the force is proportional to the square of the distance from the sun, the
effectiveness will decrease on trips to Mars and increase on trips to Venus and
Mercury. The effectiveness also depends to a great extent on how light the sail
can be made. Sails measuring hundreds, even thousands, of square meters are pro-
posed. These will weigh (with reinforcement and guides) about 10 kg per square

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ACCESSION NR: AP5000086

2

meter (weight at earth's surface). The solar force then represents but one-tenth the weight of the sail on earth, meaning that the acceleration produced by the solar force will be in the neighborhood of 1 mm/sec². The Soviet scientists A. N. Zhukov and V. N. Lebedev have determined an optimal method of guiding the sail to effect minimal time of travel. They computed that with an initial acceleration of 2 mm/sec², a flight to Mars would take 322 days, to Venus 164 days. For other values of initial acceleration (1, 3, 4, 5 mm/sec²), the times to Mars would be 405, 286, 264, and 248 days, respectively. At the initial acceleration of 2 mm/sec², the time (in years) to Mercury would be 0.53, to Jupiter 6.6, to Saturn 17, to Uranus 49, to Neptune 96, and to Pluto 145. The computations indicate that a solar sail may be used with no expenditure of fuel to move between orbits of artificial satellites in the solar system.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: SV, PR   NO REF SOV: 000   OTHER: 000

Card 2/2

MERKULOV, I., inzh.

Soviet satellites are in space. Av. i kosm. 47 no.10:6-9 O '64.

(MIRA 17:10)

L 2144-66   FSS-2/EWT(m)/EPF(c)/EWP(f)/EPA(w)-2/T-2/EWA(m)-2/ETC(m)   IJP(c)/
RPL   TT/WW/JW

ACC NR: AP5026577   SOURCE CODE: UR/0281/65/000/005/0159/0172

AUTHOR: Merkulov, I. A. (Moscow)

ORG: none

TITLE: The problem of air-breathing space engines

SOURCE: AN SSSR. Izvestiya. Energetika i transport, no. 5, 1965, 159-172

TOPIC TAGS: air breathing propulsion, ramjet, ramrocket, rocket, liquid propellant rocket, mass addition

ABSTRACT: The use of air-breathing propulsion systems for space rockets has been frequently analyzed in recent years but the results were contradictory because some studies claimed that due to design difficulties the maximum attainable Mach number is 5—6, while others made optimistic predictions of operation at high hypersonic velocities. In the present study, a thermodynamic analysis was made of air-breathing propulsion systems at flight velocities from M 5 to 50. Expressions were derived for the thrust as a function of flight velocity, heat and mass addition, efficiency of the air intake system, nozzle efficiency, kinetic energy loss, and air enthalpy. It was found that the addition of mass is equivalent to that of heat. For example, at M 4 the addition of 1 kcal per kg air is equivalent to $5 \cdot 10^{-3}$ kg of added mass; at M 10, it is equivalent to only 10^{-3} kg, and at M 40, to 10^{-4} kg. The effect of mass addition therefore increases as M increases. When $M > 21$ and there is zero mass addition,

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ACC NR: AP5026577   /

thrust cannot be generated when the diffuser used has a pressure coefficient corres-
ponding to a normal shock wave; with mass addition, however, thrust can be generated
even at lower pressure coefficients. The optimum amount of added mass is 0.7 kg/kg
air at M 50 for a given diffuser efficiency. A ramjet with a plane shock wave has
a higher specific impulse at M 30—40 than a liquid rocket can generate, but the weight
is prohibitive. At M 50, a specific impulse of 600 kg·sec/kg can be obtained which is
much higher than that of a liquid-propellant rocket. Therefore, research and develop-
ment of air-induction systems operating at cosmic velocities is very important for the
design of air-breathing propulsion systems which would accelerate spaceships in the
upper layers of the atmosphere to velocities of 15—18 km/sec. The following conclu-
sions are drawn: Air-breathing engines with addition of heat and mass can generate
thrust at cosmic velocities. The losses of kinetic energy attain a maximum of 25%
at M 5; when the first cosmic speed is attained, these losses in a diffuser with a nor-
mal shock wave amount to only 13%. Mass addition at ≥ M 15—20 increases the absolute
thrust and the specific impulse. These conclusions hold for altitudes at which the
air entering the engine can be considered as a continuum; the gas flow in the com-
bustion chamber is subsonic. Orig. art. has: 41 formulas and 10 figures.   [PV]

SUB CODE: PR,SV / SUBM DATE: 15Mar65/ ORIG REF: 005/ OTH REF: 007/ ATD PRESS:
                                                                            4122

Card 2/2

MERKULOV, I.

Spectrum of space speeds. Kryl. rod. 16 no.7:24-25 Jl '65.
(MIRA 18:8)

MERKULOV, I.G.

The MIG mud pump. Suggested by I.G.Merkulov. Rats.i izobr.
predl.v stroi. no.12:37-38 '59.   (MIRA 13:5)

1. Po materialam Glavmosoblstroya.
          (Pumping machinery)

MERKULOV, I. I.

42737. MERKULOV, I. I. : TURICHKAYA, O. I. Dinamika tabletarapennol V
Posleveennyye Gody. Oftalmol. Zhurnal, 1949, No 3, s. 116-21.

SO: Letopis' Zhurnal'nykh Statey, Vol. 7, 1949

MERKULOV, I. I.

Merkulov, I. I. - "The treatment of toxic neuritis of the optic nerve", Uchen. zapiski (Ukr. nauch.-issled. in-t oftalmologii im. prof. Girshmana), Vol. V, 1948, p. 7-12.

SO: U-3 42, 11 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 3, 1949).

MER~~I~Y, ~. ~.

Merkulov, I. I. and Melrash, B. I. - "Re--lte of the ---n--r---n- --d d--e---- --th
applications of dried placen-in", Ushen. zapis-i (---r. --n-h.-i- --d. --t -f--l-
molopii i-. -rof. -irshmana, Vol. Y, 19--, -. 1--21.

SO: U-3--2, 11 ~arch ~3, (Le---is 'Zhurnal 'ny-h Sta-ey, No. -, 1--0.

MERKULOV, . . .

Merkulov, . . ., Zhabotinskaya, . . ., and Vedrush, E. . - "Experience in . . .
osnocalcinol in certain eye infections", "chem. zapiski (. . . . .-. . ., . .-
oftalmolcii in. prof. Girshmana), Vol. 7, 1 . ', p. 47- .

SO: U-30 , 1 March 53, (Le er s 'Zhurnal 'nykh Statey, . . ., 1 .

KHOMULOV, I. I., ZHABOTINSKAYA, R. N. I MEDRESH, N. I.

26670 Opyt primeneniya ossokal'tsinolya pri nekotorykh glaznykh zabolevaniyakh
Of'almol. Zhurnal, 1940, No. 3, s. 100-13

SO: LETOPIS' NO. 35, 1940

EXCERPTA MEDICA Sec.12 Vol.11/3 Ophthalmology Mar57

448. MERKULOV I.I. *Intermittent choked disc in the case of
      cerebral neoplasm (Russian text) VOP.NEJROKHIR. 1955,
      19/1 (13-18)
In cerebral tumour choked disc does not occur as an early symptom but develops
relatively late. Regression of choked disc only occurs under one of two conditions,
viz: radical operation on the cerebral tumour or at least a relieving trephination,
or successful radiotherapy. In 5 cases of cerebral tumour choked disc was made
to disappear for a year to 2-3 weeks merely by dehydration and promotion of ab-
sorption with the aid of biochinol, without any radical control of the neoplasm.
Histologically these cases involved astrocytoma (2 cases), haemangioreticuloma(1),
medulloblastoma (1) and spongioblastoma (1 case). The tumours were localized in
the cerebellum (2 cases), the brain stem (1), the temporal lobe(1) and the fronto-
temporal region (1 case). All patients died, and at autopsy it was established that
choked disc had disappeared in spite of the fact that neoplastic growth had con-
tinued. Disappearance of choked disc, therefore, is not definitely conclusive as
an argument against the presence of a brain tumour.   (VIII, 5, 12, 16)

MERKULOV, I.I., professor; KHALFINA, F.A.

Modifications of visual field as a remote symptom of cerebral tumors. Vop.neirokhir. 19 no.6:8-13 N-D '55.   (MLRA 9:1)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta bolezney imeni prof. Girshmana i Ukrainskogo nauchno-issledovatel'skogo psikhonevrologicheskogo instituta.
      (BRAIN, neoplasms,
         manifest.,visual field changes)
      (VISION,
         field, changes in brain tumors)

MERKULOV, I. I.

802. THE DYNAMICS OF PAPILLOEDEMA IN INTRACEREBRAL TUMOURS
(Russian text) - Merkulov I. I. and Khalfina F. A. - ZH.OFTALM.
1956, 4 (195-197)

The appearance of papilloedema, its more or less rapid increase, and regression
following operation, or transition to atrophy - all serve as indicators of the course
of the main process. Of the patients with brain tumours who were examined, 19
had normal fundi bilaterally on admission; in all cases it proved possible to ob-
serve the appearance and then progressive increase of papilloedema. In one pa-
tient the appearance of papilloedema was noted on the 15th day of observation; in
other cases after 3 weeks and longer. The longest period for the appearance of
papilloedema was 2.5 yr. The time of the appearance of papilloedema did not de-
pend on the morphological structure of the tumour. Regression of papilloedema
following removal of intracerebral tumour took place over a period of up to 30
days. Atrophic phenomena in papilloedema occur more rapidly with cerebellar
midline tumours, and less rapidly with tumours of the frontal lobe.   (S)

MERKULOV I I

AL'PERN, D.Ye., professor; MERKULOV, I.I., professor; ZIL'BERMAN, Z.P.;
kandidat meditsinskikh nauk; LIPSHITS, R.U., kandidat meditsinskikh
nauk

Therapeutic effect of adenylic compounds on some types of inflammation
of the eye. Oft.zhur. 12 no.2:67-71 '57.   (MIRA 10:11)

1. Chlen-korrespondent AN USSR (for Al'pern). 2. Chlen-korrespondent
AMN SSSR (for Merkulov). 3. Iz ukrainskogo nauchno-issledovatel'-
skogo instituta glaznykh bolezney imeni prof. Girshmana (dir. -
chlen-korrespondent AMN SSSR prof. I.I.Merkulov) i iz kafedry
patologicheskoy fiziologii Khar'kovskogo meditsinskogo instituta
(zav. kafedroy - chlen-korrespondent AN USSR prof. D.Ye. Al'pern)
         (ADENYLIC ACID)   (EYE--INFLAMMATION)

MERKULOV, I.I., professor

"Diseases of the eye in complicated pregnancy" by U.Musabeili.
Reviewed by I.I.Merkulov. Oft.zhur. 12 no.2:122-124 '57. (MIRA 10:11)

1. Chlen-korrespondent Akademii meditsinskikh nauk SSSR.
        (EYE—DISEASES AND DEFECTS)
        (PREGNANCY, COMPLICATIONS OF)
        (MUSABEILI, U.)

MERKULOV, I.I., professor; YEREMENKO, N.S., nauchnyy sotrudnik

Report on the work of the Kharkov Province Ophthalmological
Society for 1955-1956. Oft.zhur. 12 no.5:315-316 '57.
(MIRA 13:6)

1. Predsedatel' pravleniya Khar'kovskogo oblastnogo obshchestva
glaznykh vrachey (for Merkulov). 2. Sekretar' Khar'kovskogo
oblastnogo obshchestva glaznykh vrachey (for Yeremenko).
(KHARKOV PROVINE--OPHTHALMOLOGICAL SOCIETIES)

MERKULOV, I.I., prof.zasluzhennyy deyatel' nauki USSR.

"Collected paper (1957)" of the Kazakh Institute of Research in
Ophthelmopathy and the Deprtment of Eye Diseases of the Kazakh Medical
Institute, devoted to the 40th anniversary of the Great October
Socialist Revolution. Oft.zhur. 13 no.5:310-312 '58   (MIRA 11:10)

1. Chlen-korrespondent AMN SSSR.
        (EYE-DISEASES)

MERKULOV, I.I., prof., zasluzhennyy deyatel' nauki.; YEREMENKO, N.S.

Report on the work of the Kharkov Ophthalmologic Society for 1957.
Oft. zhur. 13 no.6:378-380 '58.   (MIRA 12:1)

1. Predsedatel' pravleniya Khar'kovskogo oftal'mologicheskogo obshchestva
glaznykh vrachey. Chlen-korrespondent AMN SSSR (for Merkulov) 2. Sekretar'
pravleniya Khar'kovskogo oftal'mologicheskogo obshchestva glaznykh vrachey
(for Yeremenko).
        (KHARKOV--OPHTHALMOLOGIC SOCIETIES)

MERKULOV, I.I., prof., zasluzhennyy deyatel' nauki USSR; TREYMET, B.A., kand.med.nauk

Report on the work of the Kharkov Ophthalmological Society for 1958. Oft.zhur. 14 no.6:378-379 '59.   (MIRA 13:4)

1. Predsedatel' Khar'kovskogo oftal'mologicheskogo obshchestva, chlen-korrespondent AMN SSSR (for Merkulov).
                (KHARKOV--OPHTHALMOLOGICAL SOCIETIES)

KOPIT, R.Z., kand.med.nauk; POCHTMAN, S.M.; TRE EYT, B.A.; PIS'MENNAYA,
F.G., nauchnyy sotr.; MERKULOV, I.I., zasl. deyatel' nauki
USSR, prof., red.;

[History of ophthalmology in the Ukraine; the Professor L.L.
Girshman Institute oi Eye Diseases] K istorii oftol'mologii
na Ukraine; Institut glaznykh boleznei imeni professora L.L.
Girshmana. Pod red. I.I.Merkulova. Khar'kov, Khar'kovskoe
knizhnoe izd-vo, 1960. 112 p.   (MIRA 15:7)

1. Direktor instituta glaznykh bolezney imeni professora
Girshmana, Chlen-korrespondent Akademii meditsinskikh nauk
SSSR (for Merkulov).
                (UKRAINE—OPHTHALMOLOGY)

MERKULOV, I.I.

Oculomotor apparatus and its functional disorders. Vop. neirooft.
5:5-131 '60.   (MIRA 14:3)
                        (EYE—MOVEMENTS)

MERKULOV, I.I.; POKHIL, A.I.

Hyperergic reaction of the oculomotor nerve to repeated administrations of allergens. Vop. neirooft. 5:133-138 '60. (MIRA 14:3)
(OCULOMOTOR NERVE)   (ALLERGY)

MERKULOV, I.I., prof.

Treatise on the pupil. Vop.neirooft. 7:5-86 '61.

(PUPIL (EYE))

(MIRA 14:9)

MERKULOV, I.I., prof.; BABENKO, Kh.I., kand.med.nauk

Some problems of pupillary reaction to light. Vop.neirooft. 7:
87-152 '61.   (MIRA 14:9)
                    (PUPIL (EYE))

MERKULOV, I.I., zasluzhennyy deyatel' nauki USSR, prof.

"Lectures on selected sections of ophthalmology" by T.N.Gerasimenko.
Reviewed by I.I.Merkulov.   Oft. zhur. 16 no.2:127-128 '61.
(MIRA 14:3)

1. Chlen-korrespondent AMN SSSR.
(OPHTHALMOLOGY)   (GERASIMENKO, T.N.)

MERKULOV, I.I., prof.; BAKITSKAYA, O.N., nauchnyy sotrudnik

Cerebrospinal fluid in diseases of the optic nerve.   Oft. zhur.
16 no.7:387-392 '61.   (MIRA 14:12)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta glaznykh
bolezney imeni prof. Girshmana (dir. - zasluzhennyy deyatel'
nauki, chlen-korrespondent AMN prof. I.I.Merkulov).
         (CEREBROSPINAL FLUID)   (OPTIC NERVE—DISEASES)

MERKULOV, I.I., prof.; KORKUSHKO, M.A., nauchnyy sotrudnik

Retrobulbar neuritis syndrome in hypertension. Oft. zhur. 16
no.7:402-406 '61.

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta glaznykh
bolezney imeni prof. Girshmana (dir. - zasl. deyatel' nauki,
chlen-korrespondent AMN SSSR prof. I.I. Merkulov).
     (HYPERTENSION)   (EYE—DISEASES)

MERKULOV, I. I., prof.

Orbital ocular pains. Oft. zhur. 17 no.4:200-206 '62.
(MIRA 15:7)

1. Iz Ukrainskogo nauchno-issledovatel'skogo instituta glaznykh
bolezney imeni prof. L. L. Girshmana (direktor - zasluzhennyy
deyatel' nauki USSR, chlen-korrespondent AMN SSSR prof. I. I.
Merkulov).

(EYE—DISEASES)   (ORBIT(EYE)—DISEASES)
(PAIN)

KOL'MAN, E., prof.; GORPINICH, K.Ye., uchitel'; SHTEPAN, V.Ye., prepo-
davatel' teoreticheskoy mekhaniki; VLASOV, O.Ye., prof. (Moskva);
MERKULOV, I.T. (Ul'yanovsk); KUTSEV, M.M. (Kuybyshev); CHAPTYKOV,
P.G. (Leningrad); DEMIN, V.N. (Tashkent); TUKMAN, R.E. (Tallin);
GERTS, G., doktor fizicheskikh nauk, dotsent; DUDEL', S.P.,
doktor filosof. nauk, prof. (Moskva)

Finiteness and infinity in the universe; survey of letters and
articles received by the editor. Priroda 54 no.8:97-102 Ag '65.
(MIRA 18:8)
1. Shkola No.8 g. Kremenchuga (for Gorpinich). 2. Krasnoyarskiy
politekhnicheskiy institut (for Shtepan). 3. Filosofskiy fakul'-
tet universiteta im. Gumbol'dta, Berlin, Germanskaya Demokrati-
cheskaya Respublika (for Gerts).

ACC NR: AP7002667   SOURCE CODE: UR/0109/67/012/001/0093/0097

AUTHOR: Pridorogin, V. M.; Merkulov, K. G.

ORG: none

TITLE: Characteristics of silicon transistors operating in the anomolous small bias regime

SOURCE: Radiotekhnika i elektronika, v. 12, no. 1, 1967, 93-97

TOPIC TAGS: silicon transistor, volt ampere characteristic

ABSTRACT: The characteristics of silicon transistors operating under small bias conditions and at ambient temperature were studied. The volt-ampere characteristics (collector current vs. the base-to-emmitter voltage) for a P103 transistor (see Fig. 1.), typical for silicon transistors, were found, and approximate analytical expressions for the transistor characteristics were formulated. The anomalous volt-ampere characteristics of silicon transistors at small bias voltages are caused by changes in the diffusion current from the emitter and current resulting from generation and recombination of the collector junction— the components of the collector current. Similar volt-ampere character- istics were obtained for germanium transistors operating near the temperature of liquid nitrogen. Orig. art. has: 4 figures and 6 formulas.

Card 1/2   UDC: 621.382.3:546.28

ACC NR: AP7002667

Fig. 1. Volt-ampere characteristics
for a P103 silicone transistor
(collector current vs base-to-emmitter
voltage for Vce = 0.1 v).

SUB CODE: 09/ SUBM DATE: 10Jul65/ OTH REF: 003

Card 2/2

MERKULOV, K.N.

Using precast reinforced concrete for road building in Moscow.
Gor.khoz.Mosk. 30 no.11:23-28 N '56.   (MIRA 10:3)

1.Glavnyy inzhener kontory "Dormostproyekt".
                (Moscow--Road construction)
                   (Precast concrete)

MERKULOV, K.N.

Using precast reinforced concrete in the construction of quays and
bridges in Moscow. Gor.khoz.Mosk. 31 no.5:16-22 My '57.

(MIRA 12:3)

1. Glavnyy inzhener instituta "Dormostproyekt."
        (Moscow--Embankments) (Moscow--Bridges, Concrete)

MERKULOV, K.N.

Urgent tasks of building engineering and communication structures
in Moscow. Gor.khoz.Mosk. 35 no.6:29-31 Je '61.   (MIRA 14:7)

1. Glavnyy inzhener instituta "Mosinzhproyekt".
            (Moscow—Municipal engineering)

L 22417-66   EWT(m)/EPF(n)-2/EWG(m)   TW

ACC NR: AP6007943   SOURCE CODE: UR/0089/66/020/002/0106/0111

AUTHORS: Anan'yev, V. D.; Antsupov, P. S.; Kapitsa, S. P.;
                Khar'yuzov, R. V.; Matora, I. M.;
Melekhin, V. N.;   Merkulov, L. A.

ORG: none

TITLE: 30 Mev microtron injector for a fast-neutron pulsed reactor

SOURCE: Atomnaya energiya, v. 20, no. 2, 1966, 106-111

TOPIC TAGS: linear accelerator, particle accelerator component,
fast neutron, fast reactor/

ABSTRACT: The authors describe briefly the main features and
parameters of the 30-Mev microtron injector (linear-accelerator in-
jector) now in operation at the Laboratory of Neutron Physics of
OIYaN. The use of a microtron helps greatly reduce the duration of
the reactor activity burst and by the same token improve the resolu-
tion attainable with fast-neutron experiments, since the reactor does
not become supercritical and serves only as a neutron multiplier.

Card   1/2   UDC: 621.384.611.3

L 22417-66
ACC NR: AP6007943

The microtron is identical in design with that of the IFP (L. M.
Zykin et al., Transactions of International Conference on Accelera-
tors, Dubna, 1963, p. 1049). The individual units of the microtron
as modified to operate with the IBR reactor are described briefly,
together with the results of approximately 350 hours of operation.·
The electron current, separated and focused on a remote target,
reaches 60 ma in pulse. An original optical system for extraction,
focusing, and aiming the beam on the target, together with the good·
monochromatic properties of the beam (energy scatter 0.3%) and small
angle divergence ensure 100% efficiency of utilization of electrons
remaining in the last (thirtieth) orbit. The authors thank D. I.
Blokhintsev, P. L. Kapitsa, I. M. Frank, and F. L. Shapiro for con-
tinuous interest and help, and S. K. Nikolayev, B. I. Voronov, and
B. N. Bunin, whose cooperation contributed to the construction of the
accelerator. Orig. art. has: 6 figures

SUB CODE: /8   SUBM DATE: 09Aug65/ ORIG REF: 003/

Card   2/2 ЩЩ

Merkulov, L.G.

534.23 : 534.321.9

8056.   INVESTIGATION OF THE SCATTERING OF ULTRA-
SONIC WAVES IN METALS.   L.G.Merkulov.
Zh. tekh. Fiz., Vol. 26, No. 1, 64-75 (1956). In Russian.
        Measurements of the attenuation of longitudinal and
transverse ultrasonic waves (pulses at frequencies of
0.5-110 Mc/s lasting 2-10 μsec) in magnesium, iron and
copper show that at $\lambda/D > 10$ (where D is the mean grain
diameter) the coefficient of equal scattering γ follows
Rayleigh's rule $\gamma \sim D^3 f^4$. At $\lambda/D < 6$ to 10 this relationship
changes to $\gamma \sim D f^2$, and at $\lambda/D < 4$ the sound scattering pro-
cess begins to approach diffusion process. The experimental
results are in much better accord with the theory advanced
by I.M.Lifshits and G.D.Parkhomovskii (Abstr. 1069/1951;
Uchenye Zapiski Kharkovskogo Gos. Univ., Vol. 27, 25,
1948) than with that of Mason and McSkimin (Abstr. 2444/1947).
                                        A.Gelbtuch.

67980

SOV/112-59-21-45017

2⊀/800

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 21, pp 191-
192 (USSR)

AUTHOR: Merkulov, L.G.

TITLE: Absorption and Scattering of Ultrasonic Waves in Polycrystal Media

PERIODICAL: Izv. Leningr. elektrotekhn. in-ta, 1957, Nr 31, pp 3-29

ABSTRACT: A detailed review of theoretical studies on ultrasonic wave propa-
              gation in metals at various relations of the wave-length and the
              average size of metal grains. It is pointed out, that in a frequen-
              cy range from a few megacycles and above, the part played by scat-
              tering considerably increases. A special stress is put on the neces-
              sity of taking into account the transformation of waves of one type
              into another. Formulas for the scattering coefficient in media
              with crystallites of cubic and hexagonal systems are given, as well
              as computed graphs of the scattering coefficient for Al, Cu, Mg and
              Zn single crystals at any field orientation and depending on the
              type of oscillations. The absorption of ultrasonic waves in metal
              samples with frequencies of 2 - 200 megacycles was measured by the
              pulse method. The starting of the indicator sweep was rigidly syn-

Card 1/2

67980

SOV/112-59-21-45017

Absorption and Scattering of Ultrasonic.Waves in Polycrystal Media

chronized by a generator, feeding the ultrasound radiator. The pulse weakening
was measured by means of an attenuator by coincidences with some standard level.
The tested samples were subjected to various heat treatment in order to obtain
the necessary granularity; the size of grains was measured by usual metallo-
graphic methods. Experimental dependence of the damping coefficient on the fre-
quency for various Al, Mg, Fe and Cu structures is given. A strong dependence
on a very low percentage of admixtures was established. The tests on iron have
shown a substantial dependence of absorption on the size of the grain. Coeffi-
cients obtained experimentally agree with the theoretical ones only in order
(cf magnitude), which can be explained by the approximate character of the theory.

M.L.O.

Card 2/2

46-3-4/15

AUTHOR: Merkulov, L.G.

TITLE: A Theory on Ultrasonic Concentrators (Raschet ul'trazvukovykh kontsentratorov)

PERIODICAL: Akusticheskiy Zhurnal, 1957, Vol.III, Nr 3, pp.230-238 (USSR)

ABSTRACT: Conical, exponential and catenoidal horns as ultrasonic concentrators are considered. It is shown that the catenoidal concentrator is the most convenient from the point of view of amplification. A calculation of the correction for transverse deformations is carried out and some experimental results are quoted. The theory of concentrators can be based on the solution of the problem of longitudinal vibrations of rods of variable cross-section. This assumption amounts to an approximation only since longitudinal strains of a rod are necessarily accompanied by transverse strains which in turn lead to a nonuniform distribution of stresses along sections of the rod and a distortion of the front. However, it is shown that for concentrators whose length is considerably larger than their diameter, the importance of transverse strains is not very considerable and can be taken into account by means of small corrections. The experimental check on the theory shows good agreement between theoretically predicted and experimental data.

Card 1/2

46-3-4/15

A Theory on Ultrasonic Concentrators.

       There are 4 figures, 1 table and 1 Russian reference
       (a translation from English)

ASSOCIATION: Leningrad Electromechanical Institute. im.V.I.Ul'yanov
       (Lenin). (Leningradskiy elektromekhanicheskiy institut im.
       V.I.Ul'yanova (Lenina)).

SUBMITTED: December 31, 1956.

AVAILABLE: Library of Congress.

Card 2/2

AUTHOR: MERKULOV,L.G.   PA - 3558

TITLE: Absorption and Diffuse Scattering of Ultrasound in Metals.
(Pogloshcheniye i diffuznoye rasseyaniye ul'trazvuka v metallakh.
Russian)

PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 5, pp 1045 - 1050 (U.S.S.R.)

ABSTRACT: Experiments were carried out with aluminum, magnesium, and iron.
For the purpose of measuring the dying down of ultrasound, the im-
pulse method described in Zhurnal Tekhn. Fiz., 1956, Vol 26, p 64
was employed. The following was found: 1) If the frequency of ultra-
sound is increased, the quadratic character of the dependence
of the dispersion coefficient on frequency vanishes, and at

$$\lambda \leqslant \frac{D}{2}$$ the dispersion coefficient practically no longer depends

on frequency and is about inversely proportional to the average
dimension of the grain. D is the average dimension of the metal
grain, λ - the wavelength of the ultrasound. Within this range
of frequencies the dispersion process of ultrasound is of purely
diffuse character. The increase of dying down observed within
this range is determined mainly by the hysteresis losses (linear
law) and at very high frequencies additional losses seem to occur,
which are connected with thermal conductivity (quadratic law).
Thus, the full coefficient of the dying down of ultrasound in the

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PA - 3558
Absorption and Diffuse Scattering of Ultrasound in Metals.

domain $\lambda \ll \overline{D}$: $= \dfrac{\overline{R}}{\overline{D}} + A_1 f + A_2 f^2$. $\overline{R}$ is the average coefficient

of the rebound (corresponding to pressure) of an electric wave
from the intercrystal boundary. The second term of the equation
(on the right) indicates the amount of the hysteresis losses, and
the third that caused by thermal conductivity. Experimental data
show satisfactory agreement with theoretical ones. In a practical
respect the experiments carried out show that ultrasound can be
used successfully for the determination of the size of grain in
metals. (With 3 illustrations, 1 table, and 3 Slavic references)

ASSOCIATION: LETI
PRESENTED BY:
SUBMITTED: 24.7.1956
AVAILABLE: Library of Congress

Card 2/2

Merkulov, L.G.

AUTHOR: MERKULOV,L.G.   57-6-33/36
TITLE: Application of Ultra-Sound to Steel Structure Investigation.
             (Primeneniye ul'trazvuka dlya issledovaniya struktury staley,
             Russian)
PERIODICAL: Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 6, pp 1386 - 1391 (U.S.S.R.)

ABSTRACT: This is the continuation of the author's work in Zhurnal Tekhn.
             Fiz., 1956, Vol 26, Nr 1. Here the author shows the result ob-
             tained from the investigations on the fading of ultra-sound in
             some kinds of steel and he discusses the problems of a possible
             use of these results for the control of metal structure. The
             structural carbon steels 15 and 40 (0,15 % C and 0,40 % C) as
             well as the tool steel U 12 (1,2 % C) were investigated. These
             investigations showed that the coefficient of the fading of
             ultra-sound in steel depends very much on the average granular
             size and therefore on the type of heat treatment of the sample
             from a certain frequency onward. The propagation velocities of
             horizontal and vertical ultra-sound waves, however, are practical-
             ly the same with all samples. The full coefficient of fading
             was found to increase linearly with the frequency which seems
             to confirm the hysteresis character of the losses. Starting from
             a certain frequency (which depends on the average granular size)
Card 1/2   a strong increase of the fading of ultra-sound on account of the

57-6-33/36

Application of Ultra-Sound to Steel Structure Investigation.

dispersion was observed. The absorption- and dispersion losses of carbon steels were found to be much smaller than in the case of pure iron or steels with low carbon content (if the average granular size is assumed to be equal). Besides a chrome-nickel steel of the 35ChN3 brand was investigated on which occasion the author found that there is a possibility of using ultra sound for the control of the penetration hardening capacity. The fading of ultra- sound is essentially higher in the case of samples with not hardened structures than of hardened struc- tures, even if the average granular size is the same in both sample groups. (With 7 illustrations and 2 Slavic references).

ASSOCIATION: Electro-Technical Institute Leningrad V.I.UL'YANOV (LENIN). (Elektrotekhnicheskiy institut im.V.I.UL'YANOVA (LENINA),Russian)

PRESENTED BY:
SUBMITTED: 26.1.1956
AVAILABLE: Library of Congress

Card 2/2

24(1)   PHASE I BOOK EXPLOITATION   SOV/1627

Vsesoyuznaya akusticheskaya konferentsiya. 4th, Moscow, 1958

Referaty dokladov (Abstracts of Reports at the Fourth All-Union Acoustical Con-
    ference) Pt. 2. Moscow, Izd. akad SSSR, 1958. 44 p. Number of copies printed
    not given.

Sponsoring Agency: Akademiya nauk SSSR.

Resp. Ed.: L.M. Brekhovskikh, Corresponding Member, USSR Academy of Sciences.

PURPOSE: These abstracts are intended for scientists and engineers interested in
    acoustics.

COVERAGE: This is a mimeographed collection of brief abstracts of papers presented
    at the Fourth All-Union Acoustical Conference. The subjects covered are propag-
    ation of sound in nonhomogeneous media, nonlinear acoustics, ultrasonics,
    acoustic measurements, electroacoustics and architectural and structural acoustics.

TABLE OF CONTENTS:

Card 1/9

MERKULOV, L. G. and SOKOLOVA, Ye.XK S.

"Absorption of Sound in Single Crystals of Quartz,"

report presented at the 6th Sci. Conference on the Application of Ultrasound
in the investigation of Matter, 3-7 Feb 1958, organized by Min. of Education
RSFSR and Moscow Oblast Pedagogic Inst. im N. K. Krupskaya.

MERKULOV, L. G.

"Investigation of the Absorption of Ultrasonic Waves in Monocrystals."

paper presented at the 4th All-Union Conf. on Acoustics, Moscow, 26 May - 2 Jun 5 .

MERKULOV, L.G., dotsent

Seminar and conference on the physics and application of ultrasound.
Izv. vys. ucheb. zav.; radiotekh. no.3:381-382 My-Je '58.

(MIRA 11:7)

(Ultrasonics--Congresses)

MERKULOV, L (—,

AUTHOR: Dianov, D. B.   46-4-1-17/23

TITLE: Seminar on Physics and Application of Ultrasound,
            Dedicated to the Memory of S.Ya. Sokolov, a
            Corresponding Member of the Academy of Sciences of
            the USSR. (Seminar po fizike i primeneniyu
            ul'trazvuka, posvyashchennyy pamyati chlena-
            korrespondenta AN SSSR S.Ya. Sokolova.)

PERIODICAL: Akusticheskiy Zhurnal, 1958, Vol.IV, Nr.1,
            p.104.   (USSR)

ABSTRACT: A Seminar on Physics and Applications of Ultrasound,
            dedicated to the memory of S. Ya. Sokolov, was held
            on 23-26th October, 1957, in Leningrad Electro-
            Technical Institute imeni V.I. Ul'yanov (Lenin).
            More than 100 scientists and engineers from Leningrad,
            Moscow and other towns took part in this seminar.
            Sokolov's scientific work on ultrasound was described
            by G.V. Odintsov and E.S. Sokolova; and L.L. Myasnikov
            and S.N. Rzhevkin described their personal contacts
            with Sokolov. A large group of papers dealt with
            "ultraacoustoscopy", the subject which was developed
Card 1/3   by Sokolov. L.G. Merkulov, N.A. Yevdokimcv and

Seminar on Physics and Application of Ultrasound, Dedicated 46- 4-1-17/23
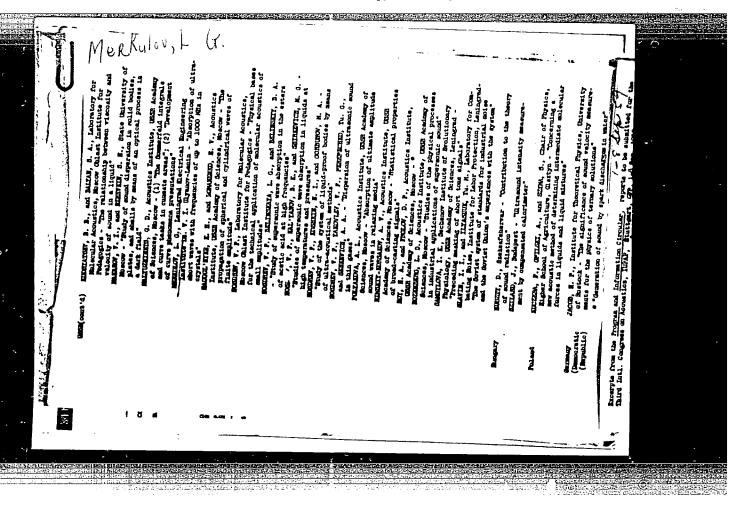to the Memory of S.Ya. Sokolov

A.S. Golubev, in their paper on "Ultrasonic Methods
of Studies of Solids" described Sokolov's and his
co-workers' work on ultrasonic testing for defects.
A.K. Gurvich spoke on "Further Development of Ultra-
sonic Apparatus for Quality Control of Welded Joints";
B.N. Masharskiy reported on defect tracing by change of
frequency and use of standard defects; transmission
of ultrasound across a boundary between two solids was
described by B.D. Dianov; V.V. Bogorodskiy and I.V.
Zashchuk reported the results of ultrasonic measurement
of properties of ice and concrete respectively. The
subject of making acoustic field visible was dealt
with in papers by V.G. Prokhorov - "On Transformation
of an Ultrasonic into a Visible Image" (electron-
acoustic convertors), P.V. Ponomarev (use of piezo-
electric mosaics), and Ye.D. Pigulevskiy (convex
images in liquids). Ultrasonic absorption in
liquids was dealt with by B.B. Kudryavtsev in "Use of
Ultrasonic Measurements in Physico-Chemical Studies".
V.F. Nozdrev reported measurements of critical constants
Card 2/3 using ultrasonics, and S.A. Balyan spoke on propagation

Seminar on Physics and Application of Ultrasound, Dedicated
to the Memory of S.Ya. Sokolov.

           AC- 4-1-17/23

of ultrasound in reacting liquids. Measurement of
ultrasound velocity and absorption were dealt-with
in papers by V.F. Nozdrev, V.F. Yakovlev, N.I. Koshkin
("Development of Professor S.Ya. Sokolov's Ideas on
Pulse Technique in the M.O.P.I Laboratory"), I.G.
Mikhaylov ("Application of a Piezoelectric Quartz
Wedge to Measurement of Absorption in Liquids"), V.A.
Solov'yev ("Application of a Composite Piezoelectric
Vibrator in the Study of Polymers"), and G.N. Feofanov
("Measurement of Velocity of Propagation of Ultrasonic
Waves in Liquids using the Method of Pulse Interfero-
metry"). Two papers on the effect of ultrasonics
on crystallization were read: I.I. Teumin on "The
Effect of Elastic Vibrations on Crystallization and
on Technical Properties of Metals and Alloys", and
Kh.S. Bagdasarov on "The Effect of Ultrasonic Vibrations
on Crystallization Processes.".

Card 3/3   1. Physics—Conference   2. Ultrasound—Applications   3. Ultra-
          acoustoscopy

Merkulov, L G.

SOV/46-5-2-9/34

AUTHORS: Merkulov, L.G.   and   Kharitonov, A.V.

TITLE: Theory and Calculation of Composite Concentrators
          (Teoriya i raschet sostavnykh kontsentratorov)

ABSTRACT: In an earlier paper (Ref.1) Merkulov discussed simple
          ultrasonic concentrators in the form of conical, exponential
          and catenoidal horns.   Composite concentrators, formed by
          joining the rods of constant and variable cross-sections
          (Fig.1), are also of interest.   Some work has already been
          published on composite concentrators (Refs.2,3), but the
          lack of a technique of calculation of properties of such
          concentrators has impeded their practical application.   The
          authors remedy this by deriving general expressions for the
          condition of resonance, the amplification factor and the
          input impedance of composite concentrators.   Some cases of
          practical importance, shown in Figs.2-9, are dealt with in
          detail, and the best forms of concentrators are determined.
          The input impedance characteristics of various concentrators
Card 1/3 near the resonance frequency are shown in Fig.11.   To

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Theory and Calculation of Composite Concentrators

verify the theoretical results the authors tested several
concentrators made from steel St.40.   The testing technique
was essentially the same as that described in Ref.1, but
certain improvements to it made it possible to measure the
resonance frequency within 0.1% and the amplification
factor to 5-10%.   A table on p 189 shows the results
obtained on testing a conical horn with a cylindrical rod,
and an exponential horn, also with a cylindrical rod.   The
empirical values of the amplification factor (col.9)
agree with the theoretical values (col.7) within the
experimental error.   The empirical resonance frequencies
(col.8) are somewhat lower than the theoretical values
(col.6).   A "stepped" concentrator (shown in Fig.8) was
also tested experimentally and the results are shown in Fig.12.
The experimental values of the amplification factor agree
well with the theoretical values, but the agreement between
the empirical and theoretical resonance curves is somewhat
poorer (probably because of bending vibrations).   The
authors studied also three-piece concentrators;   good agreement
Card 2/3   between the calculated and experimental values of the

Theory and Calculation of Composite Concentrators   SOV/46-5-2-9/34

amplification factor was obtained, while the empirical
resonance frequency was found to be somewhat lower than
the theoretical value and it depended strongly on the form
of the intermediate piece which joined the two outer parts
of the concentrator (e.g. Fig.9).   There are 12 figures,
1 table and 4 references, of which 2 are Soviet, 1 English
and 1 translation of English into Russian.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V.I.
Ul'yanova (Lenina) (Leningrad Electro-Technical Institute
imeni V.I. Ul'yanov (Lenin))

SUBMITTED: April 18, 1958

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SOV/46-5-2-29/34

AUTHOR: Merkulov, L.G.

TITLE: The Seventh Scientific Conference on Application of Ultra-
sound to the Study of Matter (Sed'maya nauchnaya konferentsiya
po primeneniyu ul'traakustiki k issledovaniyu veshchestva)

PERIODICAL: Akusticheskiy zhurnal, 1959, Vol 5, Nr 2, pp 255-256
(USSR)

ABSTRACT: The Seventh Scientific Conference on Application of Ultra-
sound to the Study of Matter was held on February 10-14,
1959 in Moscow.   It was convened by the Ministry of
Education of the Russian Soviet Federal Socialist Republic
and the Moscow Regional Pedagogical Institute imeni N.K.
Krupskaya (MOPI).   Five hundred delegates, representing
higher educational establishments and research institutes of
Moscow, Leningrad, Khar'kov, Voronezh, Ufa, Yoshkar-Ola
and other cities, took part in the Conference.   Scientists
from Poland and   GDR   were also present.   Apart
from plenary meetings sessions were held also in five
specialist sections.   Over 80 papers and reports were read
at the Conference.   At the first plenary meeting V.F.
Card 1/5   Nozdrev   spoke on "The physical basis of engineering

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The Seventh Scientific Conference on Application of Ultrasound to the Study of Matter

applications of small-amplitude molecular acoustics". New applications of ultrasound in industry were dealt with by B.B. Kudryavtsev. Several other papers were also read at the plenary meetings: "On dispersion of acoustic waves in rarefied gases" (A.S. Predvoditelev); "Theory of ferro-electrics" (N.S. Akulov); "Molecular kinetic theory of propagation of sound" (A. Adkhamov); a review of the work on propagation of finite-amplitude waves in liquids (V.A. Krasil'nikov and L.K. Zarembo). The papers of the foreign guests were also heard at the plenary meetings: M. Kwiek of Poland spoke on the application of molecular kinetic theory of gases to finite-amplitude wave problems; F. Kuczer, also from Poland, dealt with ultrasonic methods of study of the composition of liquid mixtures; L. Rothard of GDR spoke on ultrasonic studies of silicic acid gel and its derivatives. The majority of papers read at the sessions of the Section for Molecular Acoustics dealt with acoustic

Card 2/5   methods of studies of liquid structure (B.B. Kudryavtsev,

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The Seventh Scientific Conference on Application of Ultrasound to the Study of Matter

L. Rothard   A.P. Senkevich, V.N. Zalivcniy, A.A. Glinskiy, S.A. Balyan, M.G. Shirkevich and others). A joint paper by B.B. Kudryavtsev, V.F. Nozdrev, N.I. Koshkin and V.F. Yakovlev dealt with general problems of molecular acoustics and certain controversial questions. Papers were also read on propagation of sound in liquids (L.G. Belinskaya, O.A. Starostina, V.D. Sobolev, V.M. Zakurenov and others), on measurement of sound velocity at high pressures (L.F. Vereshchagin, N.A. Yuzefovich), effect of ultrasound on various substances and of physico-chemical processes (N.I. Larionov, L.N. Bryukhatov, M.N. Levinson, A.A. Gurevich, B. Belov, Ye.N. Nesis and others. A method of measuring absorption by multiple transmission, developed at the Moscow Regional Pedagogical Institute (MOPI) was described by V.F. Nozdrev and V. Kovaleva at a meeting of the Section for Acoustic Methods. The use of optical methods in acoustical studies was dealt with by V.F. Yakovlev, A.A. Glinskiy, Yu. Nevskiy and

Card 3/5   others.   Some of the papers described ultrasonic instruments

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The Seventh Scientific Conference on Application of Ultrasound to the Study of Matter

(V.I. Ilgūnas, I.N. Kogan), gas-jet generators (M.A. Varlamov) and other applications of acoustics. Papers read at the sessions of the Industrial Ultrasonics Section dealt with the effect of ultrasound on various electro-chemical processes (Yu.M. Bystrov, F.I. Kukoz, A.N. Trofimov, A.I. Ryazanov), removal of corrosion products from metallic coatings by means of ultrasound (L.B. Pirozhnikov), use of ultrasound in welding (L.A. Ol'shanskiy, L.F. Lependin, A.V. Mordvintseva), special technological applications of ultrasound (N.N. Znamenskiy, A.G. Lifshits, A.I. Greshnev and others), the effects of ultrasound on properties of solids (A.P. Kapustin, Kh.S. Bagdasarov, I.L. Cherchenko, F.L. Lokshin, V.Ye. Kavaliūnaitě, I.N. Kuz'min and others). At the meetings of the Section for Propagation of Ultrasound in Solids papers were read on absorption of ultrasound in monocrystals (L.G. Merkulov), the effect of ultrasound on magnetic materials (V.S. Cherkashin, A.I. Drokin), application of an electron-acoustical transducer in the study of uniformity of metals

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SOV/46-5-2-29/34

The Seventh Scientific Conference on Application of ultrasound to the Study of Matter

(G.A. Lushnikov, P.K. Oshchenkov), ultrasonic methods of studies of physical properties and structure of electrical ceramics (L.A. Yakovlev, N.S. Akulov and L.G. Merkulov), and ultrasonic studies of coal (A.K. Matveyev and Ye.G. Martynov). Teaching and administration problems were dealt with by Ye.K. Baranov, V.F. Yakovlev, S.I. Mel'nikov and others.

Card 5/5

SOV/46-5-3-15/

25(6), 24(1)

AUTHORS: Verevkin, V.M., Yevdokimov, N.A., Zharkov, K.V. and Merkulov, L.G.

TITLE: An Ultrasonic Recording Flaw Detector for Metal Sheets (Ul'trazvukovaya ustanovka s zapis'yu izobrazheniy defektov v metallicheskikh listakh)

PERIODICAL: Akusticheskiy zhurnal, 1959, Vol 5, Nr 3, pp 364-366 (USSR)

ABSTRACT: The paper describes an ultrasonic flaw detector for quality control in rolling of sheets, developed at the Leningrad Electro-Technical Institute imeni V.I. Ul'yanov (Lenin). The detector (shown schematically in Fig 1) works on the shadow principle. The sheet KL, whose quality is controlled passes in water between an array of radiating vibrators IV and an array of receiving vibrators RV. Fig 1 shows for the sake of simplicity only nine pairs of vibrators; in the actual detector their number is considerably greater. Ultrasonic oscillators G, working at 1.3 Mc/s, feed certain groups of radiators. The receivers are also grouped and their signals are fed to amplifiers P. The image of the defect is recorded on heat-sensitive paper by means of a recorder ZU. The radiators are switched on consecutively by means of a synchronizer S which produces in this way an ultrasonic beam passing 50 times per second across the continuously moving metal sheet. If the beam meets a defect in the sheet a signal is produced at the output amplifying stage. A resolving device RU

Card 1/2

An Ultrasonic Recording Flaw Detector for Metal Sheets   SOV/4(.-5-3-15/??

(circuit in Fig 2) determines which pair or pairs of the vibrators are
responsible for the signal (e.g. pairs 5, 6 and 7 in Fig 1). ..t the
recording stage traces are produced which show the location and the
extent of the flaw, as shown in Fig 3. The latter figure represents a
pattern produced by a cleavage in a 40 mm thick metal sheet recorded ...
a detector with 64 vibrator pairs. The detector can be used to control
the quality of sheets with comparatively rough surfaces immediately after
rolling. The principle of the detector is in fact a new method of
ultrasonic visualization and could, therefore, be used for purposes
other than factory quality control. There are 3 figures.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V.I. Ul'yanova (Lenina).
(Leningrad Electro-Technical Institute imeni V.I. Ul'yanov (Lenin) ,

SUBMITTED: March 30, 1959

Card 2/2

SOV/46-5-3-22/32

`24(1), 24(6)`

AUTHORS: Merkulov, L.G. and Yakovlev, L.A.

TITLE: Absorption of Ultrasonic Waves in Crytalline Quartz at Frequencies up to 1000 Mc/s (Pogloshcheniye ul'trazvukovykh voln v kristallicheskom kvartse na chastotakh do 1000 mggts)

ABSTRACT: Employing a pulse technique the authors measured the coefficients of absorption of ultrasound in natural crystalline quartz between 10 and 1000 Mc/s at temperatures from -195°C to 200°C. Samples without visible defects were cut in such a way that their faces were perpendicular to the X, Y and Z axes with an error not greater than 3'; the opposite faces were parallel to within 5". A spectral analysis of one of the crystals yielded the following results: 0.005% of Mg, 0.008% of Al, 0.08% of Fe, 0.01% of Ca; no traces of Mn, Cu or Ti were found. The ultrasonic waves were excited using electrodes of 5-10 mm dimensions placed on the crystal surface and fed with pulses from a high-frequency generator. A strong electric field produced in this way at a crystal face induced vibrations of this face which were propagated as sound pulses into the sample. The exciting electrodes were used also as a receiver. The positions of the electrodes used to excite waves propagated

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SOV/46-5-3-22/32

Absorption of Ultrasonic Waves in Crystalline Quartz at Frequencies up to 1000 Mc/s

along the X and Y axes are shown in Fig 1. To excite longitudinal waves along the Z-axis it was necessary to employ the usual technique using acoustical piezo-vibrators; this limited the range of frequencies to 200 Mc/s. Figs 2, 3 and 4 show the measured values of the absorption coefficients for shear and longitudinal waves propagated along the X, Y and Z axes respectively. All the absorption coefficients were approximately proportional (except at the lowest frequencies) to the square of the frequency. The losses, represented by the absorption coefficients, can only be partially explained by thermo-elastic relaxation or by motions of dislocations in one atomic plane. Fig 5 shows the temperature dependence of the absorption coefficient for a shear wave propagated along the Y-axis at frequencies of 810 (curve a), 565 (curve 6) and 85 (curve 8) Mc/s. The weak dependence of the absorption coefficient α on temperature shows that the diffusion processes are not predominant in absorption of ultrasound in the range of temperatures employed. The temperature dependences show no definite relaxation maxima; in particular the relaxation peak reported by Bommel, Mason and Warner (Ref 1) at $\omega = 10^{13}\exp(-1300/RT)$ was not observed. The increase of absorption at low temperatures (Fig 5) was less than expected. The pulse technique was also used to find the velocity of propagation of ultrasound and

Card 2/3

SOV/46-5-3-22/32

Absorption of Ultrasonic Waves in Crystalline Quartz at Frequencies up to 1000 Mc/s

elastic constants of quartz; the results agreed well with the published
data (Ref 2). Up to 1000 Mc/s the values of the ultrasonic velocity
were constant within the limits of the experimental error ($\sim$0.5%).
Acknowledgment is made to S. Ya. Sokolov and G. Ye. Grachev of the
Electroacoustics Laboratory, Leningrad Electrotechnical Institute, who
are the originators of the excitation method described above. There
are 5 figures and 2 English references.

ASSOCIATION:Leningradskiy elektrotekhnicheskiy institut im. V.I. Ul'yanova (Lenina).
            (Leningrad Electrotechnical Institute imeni V.I. Ul'yanov (Lenin)).

SUBMITTED: March 17, 1959

Card 3/3

MERKULOV, L.G.

Absorption of ultrasonic waves in some alkali halide crystals.
Akust.zhur. 5 no.4:432-439 '59.   (MIRA 14:6)

1. Leningradskiy elektrotekhnicheskiy institut imeni V.I.Ul'yanova
(Lenina).
        (Alkali halide crystals) (Ultrasonic waves)

MERKULOV, L. G.

/ /

PHASE I BOOK EXPLOITATION   SOV/5644

Vserossiyskaya konferentsiya professorov i prepodavateley pedagogicheskikh
institutov

Primeneniye ul' traakustiki k issledovaniyu veshchestva. vyp. 10. (Utilization
of Ultrasonics for the Investigation of Materials. no. 10) Moscow, Izd-vo
MOPI, 1960. 321 p. 1000 copies printed.

Eds.: V. F. Nozdrev, Professor, and B. B. Kudryavtsev, Professor.

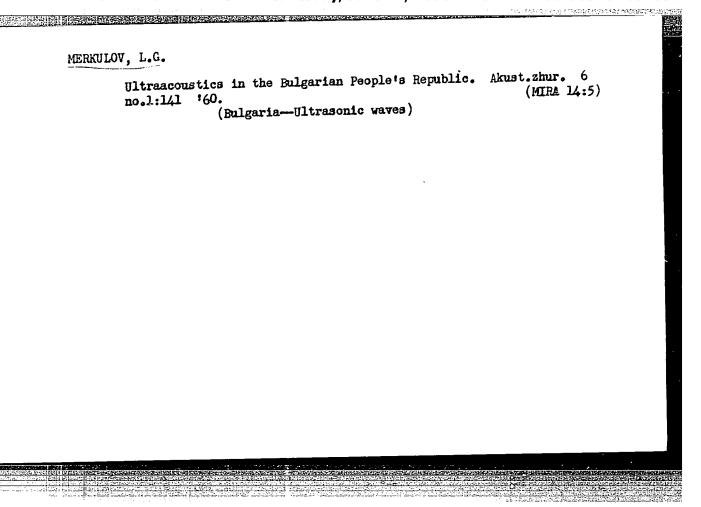PURPOSE: This book is intended for physicists and engineers interested in
ultrasonic engineering.

COVERAGE: The collection of articles reviews present-day research in the
application of ultrasound in medicine, chemistry, physics, metallurgy, ce-
ramics, petroleum and mining engineering, defectoscopy, and other fields.
No personalities are mentioned. References accompany individual articles.

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Utilization of Ultrasonics (Cont.)   SOV/5644

    and Electroacoustical Coagulation of Aerosols   169

Merkulov, L. G., and L. A. Yakovlev [LETI im. V. I. Ul' yanova
    (Lenina), GIEKI - Leningrad Electrotechnical Institute imeni
    V. I. Ul' yanov (Lenin), State Electric Ceramics Research
    Institute]. The Use of Ultrasound in Studying the Physical
    Properties and Structure of Ceramic Materials   179

Gezburg, A. A. [Belorussk. politekhn. in-t im. I. V. Stalina -
    Belorussian Polytechnical Institute imeni I. V. Stalin]. An
    Ultrasonic Device for Polishing Sheet Glasses   193

Greshnev, A. I. [Akademiya kommyn. Khoz-va im. K. D. Pamfilova -
    Academy of Municipal Services imeni K D. Pamfilov]. New
    Vibration Washing Machines   199

Card 7/10

MERKULOV, L.G.

Ultraacoustics in the Bulgarian People's Republic. Akust.zhur. 6
no.1:141 '60.   (MIRA 14:5)
          (Bulgaria—Ultrasonic waves)

S/046/60/006/02/12/019
B014/B014

AUTHORS: Merkulov, L. G., Yakovlev, L. A.

TITLE: Ultrasonic Studies on Deformed NaCl Crystals

PERIODICAL: Akusticheskiy zhurnal, 1960, Vol. 6, No. 2, pp. 244-251

TEXT: In the experiments under consideration the authors carried out
the same measurements and pretreatment of crystal samples as L. G.
Merkulov. The crystals were deformed along the crystallographic direction
{100}. The authors studied the dependence of sound absorption on the
degree of deformation in the same direction at frequencies of 5-200 Mc/s.
The dependence of the absorption coefficient on deformation is graphical-
ly represented for two crystals and frequencies of 16 and 80 Mc/s
(Fig. 1). A linear dependence was found to exist. The authors examined
the deformation dependence of absorption in a wide frequency range in
order to clarify the mechanism of absorption. Results are graphically
shown in Fig. 3. The resulting curves differ considerably from those of
undeformed crystals, since a maximum of resonance appears which is
flattened with increasing aging of the sample and is shifted toward

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Ultrasonic Studies on Deformed NaCl Crystals   S/046/60/006/02/12/019
                                                 B014/B014

higher frequencies. Next, the authors give experimental results on the
absorption of longitudinal and transverse waves in crystals through
which ultrasonic waves pass in various directions. The results are
given in a table and in the diagram of Fig. 4. Further, the changes of
the absorption coefficient in aging for various plastic deformations
are graphically shown in Fig. 5. A comparison is made between
absorption in deformed and undeformed crystals, and the theory of dis-
locations is discussed, which offers an explanation of the dependence of
absorption on the type of wave and on the direction of propagation.
The behavior of NaCl crystals in absorption is described with the help
of the theory of dislocations. Finally, a résumé is given, in which it
is stated that the ultrasonic technique makes it possible to detect small
changes in the crystal lattice. The authors point out that measurements
of absorption and ultrasonic velocity will help to clarify the nature of
dislocations and lattice defects. There are 8 figures, 1 table, and
9 references: 3 Soviet, 4 American, 1 German, and 1 British.

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Ultrasonic Studies on Deformed NaCl Crystals   S/046/60/006/02/12/019
                                                 B014/B014

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut
             (Leningrad Institute of Electrical Engineering)

SUBMITTED: February 4, 1960

Card 3/3

MERKULOV, L.G.

I I 800   1521 1087

32919
S/194/61/000/011/049/070
D271/D302

AUTHORS: Bystrov, Yu.M., Gulya-Yanovskiy, V.V., Komissarova,
              R.F., Merkulov, L.G., Novitskiy, V.A. and Sil'ver-
              stov, S.P.

TITLE: Nickel plating of type metal stereo plates in the
              ultrasonic field

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika,
              no. 11, 1961, 11, abstract 11 E81 (Poligr. proiz-vo,
              1961, no. 4, 13-15)

TEXT: The process of electrodeposition of metals in the
ultrasonic field is briefly considered; it is pointed out that ult-
rasonics intensify this process which is explained by acceleration
of diffusion phenomena in the near-cathode layer. Nickel plating
of stereos with the purpose of increased wearability was conducted
under the influence of ultrasonic frequency of 27 kc/s, with the
specific power of $0.004 - 7$ W/cm^2. It is shown that application

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S/194/61/000/011/049/070
D271/D302

Nickel plating of type metal...

of ultrasonics made it possible to shift the threshold of quality coverage from 1.5 to 5 A/dm^2; this accelerates by four times the process of nickel deposition. At the same time, ultrasonic vibrations make it possible to raise cover hardness to 450 kg/mm^2 (instead of 250 when usual methods of nickel plating are used). It is noted that it is not worth while increasing the ultrasonic intensity beyond 0.5 W/cm^2 as the deposition of metal function of current remains virtually constant after this limit. An experimental ultrasonic bath was developed with a capacity of 80 l, using two vibrators type PM-1.3; experimental plating was done in this bath in optimal conditions. It was found that by using ultrasonics nickel plating can be accelerated altogether by 6-8 times. 5 figures. 1 table. /Abstracter's note: Complete translation_/

Card 2/2

6.8600 (also 1063,1159)

30054
S/046/61/007/004/012/014
P104/B102

AUTHORS: Merkulov, L. G., Sokolova, Ye. S.

TITLE: Ultrasonic absorption in Rochelle salt near the Curie point

PERIODICAL: Akusticheskiy zhurnal, v. 7, no. 4, 1961, 495-496

TEXT: I. A. Yakovlev and T. S. Velichkina (Dva novykh yavleniya pri
fazovykh prevrashcheniyakh vtorogo roda (Two new effects in second-order
phase conversions). Usp. fiz. nauk, 1957, 13, 411-433) observed a very
distinct absorption coefficient maximum in Rochelle salt above the Curie
point. This effect was only found for transverse waves with u_{yz} deforma-
tions and is explained by losses due to relaxation polarization. The
authors showed that there was also a noticeable increase of absorption
near the Curie point for longitudinal waves. Samples obtained from
chemically pure materials measured 50·50·50 mm. The faces of the samples
were perpendicular to the crystallographic axes which made it possible to
measure with purely longitudinal waves. Keeping the temperature very
constant assured that a possible temperature gradient could not exceed
Card 1/2

Ultrasonic absorption in Rochelle salt ...

30054
S/046/6'/C37/CA/C 3/14
B104/B102

0.05°C/cm. The temperature increase was 0.3 - 0.4°C per hour when passing through the Curie point. The absorption coefficient was measured with 6 Mc/sec. Results are shown in a figure. It has been established that increased absorption exists in the ferroelectric range only. If a sufficiently strong and constant electric field is applied along the x-axis, an increase in ultrasonic absorption is not observed when passing through the Curie point. This effect is explained by general considerations. It is shown that the absorption coefficient may be calculated in a similar way as that when calculating the linear piezoelectric effect. There are 1 figure and 3 Soviet references.

ASSOCIATION: Leningradskiy elektrotekhnicheskiy institut im. V. I. Ul'yanova (Lenina) (Leningrad Electrotechnical Institute imeni V. I. Ul'yanov (Lenin))

SUBMITTED: April 12, 1960

Card 2/3 2

MERKULOV, L.G.

"The industrial welding of aerosols."

Paper presented at the Intl. Symposium on Ultrasonics Application,
Bratislava, CSSR   6-12 Sep 1962

DIANOV, D.B.; MERKULOV, L.G.; NIKITENKO, V.I.

Precipitation of zinc oxide aerosols in an acoustic field. Akust.
zhur. 8 no.1:60-66 '62.   (MIRA 15:4)

1. Leningradskiy elektrotekhnicheskiy institut imeni V.I.Lenina
(Ul'yanova).
     (Aerosols)   (Zinc oxide)   (Ultrasonic coagulation)