L 21840-66

ACC NR: AP6004913

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 6.7 ± 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. Orig. art. has: 19 formulas and 8 figures. [CS]

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

Card 2/2 nst

L-00674-67   EWT(1)/EWP(e)/EWT(m)/EWP(i)   IJP(e)   WG/WW/GG/HQ/WH

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

AUTHOR: Ambartsumyan, R. V1; 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

Card 1/2

L 00574-67

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:
SD37

Card   2/2   vlr

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

AUTHOR: Ambartsumyan, R. V.; Basov, N. G.; Zuyev, V. S.; Kryukov, P. G.;   55
Letokhov, V. S.; Shatberashvili, O. B.   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

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 exponen-
tial 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 com-
parable to the duration of the integral pulse. The spatial development of generation

Card   1/2
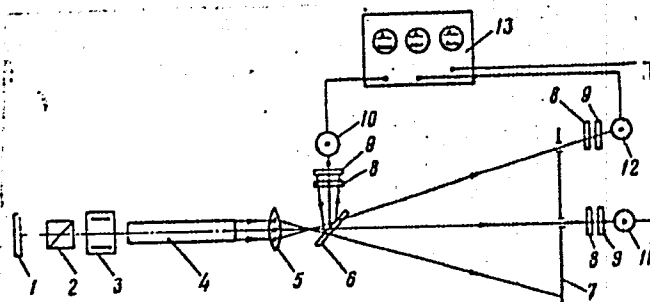
L 44793-66

ACC NR: AP6031433

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, ZhETF, 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

Card 2/2   blg

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

Card   1/2

L 44732-66

ACC NR: AP6031988

Fig. 1. Diagram of setup for obtaining and record-
ing giant superluminescence pulses. 1 - Dense mirror,
2 - Kerr shutter, 3 - neodymium-glass rods, 4 - fil-
ter, 5 - coaxial photocell.
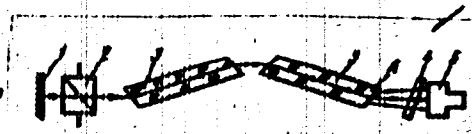
medium at $K \simeq 10^8$ had an approximate energy 4 J and a duration at half-maximum 9 - 12
nsec. The start of the pulses lagged the time of gain switching t_1 by 25 - 30 nsec.
The medium was thus de-excited within less than three passes, the main energy being
radiated within a time shorter than T_0. The power of the obtained superluminescence
pulses reached 500 MW/cm². 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

ACC NR: AP6036812   SOURCE CODE: UR/0368/66/005/005/0604/0608

AUTHOR: Zuyev, V. S.; Shcheglov, V. A.

ORG: none

TITLE: The propagation of a light pulse through a nonlinear absorbing medium

SOURCE: Zhurnal prikladnoy spektroskopii, v. 5, no. 5, 1966, 604-608

TOPIC TAGS: nonlinear optics, optical filter, phthalocyanine, passive switching

ABSTRACT: The bleaching of a nonlinear optical filter and changes in the shape of a light pulse through it were studied theoretically for a phthalocyanine solution model represented as a two-level system. The case of the propagation of a Gaussian pulse through a medium in the ground state was considered. The effect of the pulse parameters on the degree of bleaching was observed. The results indicate that although the amplitude of the pulse decreases with the thickness of the medium, the pulse "wings" are clipped. As a result, the pulse energy decreases proportionately. The shape of the pulse through the medium becomes asymmetrical with time, and its interaction with the medium causes bleaching of the latter. The spontaneous decay is dominant and the

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ACC NR: AP6036812

medium subsequently returns to its original state. A reduction in the
pulse amplitude leads to deformation of both the pulse shape and
bleaching curve, resulting in a decrease in the depth of bleaching. An
increase in the lifetime of excited molecules τ also causes considerable
pulse deformation. In the case of small τ, the pulse width at first
narrows and then broadens, while the amplitude increases monotonically
to its critical value. Orig. art. has: 3 figures and 14 formulas.

SUB CODE: 20/ SUBM DATE: 09Aug65/ ORIG REF: 005/ OTH REF: 006/
ATD PRESS: 5107

Card 2/2

ZUYEV, V. S.

Fotoproyektsionnyy metod izgotovleniya shablonov i maketirovaniya trub (Photo projection method of making molds and of modeling pipe, by) K. T. Ivin, V. V. Kashlev, V. S. Zuyev (Moskva?) Sudpromgiz, 1953.
41 p. illus., diagrs.

N/5
733.95
.19

IVIN, K.T.; KASHLEV, V.V.; ZUYEV, V.S.; DUKEL'SKIY, V.A., otv. red.;
DYUZHENKO, G.A., red.; FRUMKIN, P.S., tekhn. red.

[Slide projection method of manufacturing pipe templetes
and models] Fotoproektsionnyi metod izgotovleniia shablonov
i maketirovaniia trub. [n.p.] Sudpromgiz, 1953. 41 p.

(MIRA 16:8)

(Marine pipe fitting)
(Photomechanical processes)

IVIN, Konstantin Timofeyevich; MIKHELEV, D.I.,
otvetstvennyy redaktor; MISHKEVICH, G.I., redaktor; FRUMKIN, P.S.,
tekhnicheskiy redaktor

[New methods of preparing piping systems of ships] Novoe v tekhno-
logii izgotovleniia sudovykh truboprovodov. Leningrad, Gos.soiuz-
noe izd-vo sudostroit.promyshl., 1957. 82 p.   (MIRA 10:9)
        (Marine pipe fitting)

LYTKIN,T.S.; ZUYEV,V.T.

Mechanization of the assembly of heels and vamps. Leg.prom.15
no.7:48 Jl'55.   (MIRA 8:10)
                        (Machinery)

ZUYEV, V. T.

KOTEL'NIKOV, V.M., kand.tekhn.nauk; CHENTSOVA, K.I., kand.tekhn.nauk;
ZYBIN, Yu.P., doktor tekhn.nauk; KOCHETKOVA, T.S.; ZAKATOVA, N.D.,
kand.tekhn.nauk; GUBAREV, A.S., kand.tekhn.nauk; SHVETSOVA, T.P.,
inzh.; VOROB'YEVA, A.A., kand.tekhn.nauk; MIRSKIY, V.I., inzh.;
NISNEVICH, Ye.A., kand.tekhn.nauk; GOL'DSHTEYN, A.V., inzh.;
KALASHNIKOVA, T.A., inzh.; SHUSTOROVICH, M.L., kand.tekhn.nauk;
MOREKHODOV, G.A., inzh.; ZAKHAROV, S.R., retsenzent; BLAGOVESTOV,
B.K., retsenzent; STRONGINA, O.P., retsenzent; SHMIDT, M.I., re-
tsenzent; ZUYEV, V.T., retsenzent; KOSAREV, M.I., retsenzent;
STEPANOV, T.S., retsenzent; RAMM, S.N., retsenzent; PEVZNER, B.M.,
retsenzent; VEYNBERG, I.A., retsenzent; TURBIN, A.S., retsenzent,
SMIRNOVA, Ye.V., retsenzent; BUGOSLAVSKAYA, L.A., retsenzent;
GAMOVA, A.S., retsenzent; KHANIN, N.M., retsenzent; MURVANIDZE,
D.S., red.; PLEMYANNIKOV, M.N., red.; GRACHEVA, A.V., red.; MEDVEDEV,
L.Ya., tekhn.red.

[Shoemaker's handbook] Spravochnik obuvshchika. Vol.1. Moskva,
Gos.nauchno-tekhn.izd-vo lit-ry po legkoi promyshl. 1958. 540 p.
                                    (MIRA 12:4)
1.Gosudarstvennaya Ordena Lenina i Ordena Trudovogo Krasnogo Znameni
obuvnaya fabrika "Skorokhod" imeni Ya.Kalinina (for Zakharov, Blago-
vestov, Strongina, Shmidt, Zuyev, Kosarev, Stepanov, Ramm, Pevzner,
Veynberg, Turbin, Smirnova, Bugoslavskaya, Gamova, Khanin).
                     (Shoe manufacture)

ZUYEV, Viktor Tikhonovich; GRACHEVA, A.V., red.; LEVITSKAYA, N.N.,
        tekhn.red.

    [Designing molds for pressing rubber shoe bottom parts]
    Proektirovanie press-form dlia rezinovykh detalei niza obuvi.
    Moskva, Izd-vo nauchno-tekhn.lit-ry RSFSR, 1960. 203 p.
                                                    (MIRA 13:12)

            (Rubber industry--Equipment and supplies)
                (Boots and shoes, Rubber)

ZUYEV, V.V.,master

Destruction of the submerged runner of a large Francis turbine by cavitation. Elek.sta.29 no.3:87 Mr '58.   (MIRA 11:5)
(Cavitation) (Hydraulic turbines)

ZUYEV, V. Ye.

"Investigation of the Interaction Between Molecules in the System
Quinone-Phenol With the Aid of the Electron Absorption Spectrum."
Cand Phys-Math Sci, Tomsk U, Tomsk, 1954. (RZhKhim, No 17, Sep 54)

SO: Sum 432, 29 Mar 55

USSR/Chemistry - Physical chemistry

Card 1/1   Pub. 43 - 54/62

Authors   : Zuyev, V. Ye.

Title   : Intermolecular reaction and electron absorption spectra of quinone and
              phenol in different states of aggregation

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 732-733, Nov-Dec 1954.

Abstract   : The electron absorption spectra were investigated in the visible and ultra-

Institution : The V. V. Kayoyanov State University and the Siberian Phys.-Techn. Inst.,
              Tomsk

Submitted   : ....

ZUYEV, V.Ye.; KHMELEVTSOV, S.S.; KABANOV, M.V.

Studying intermolecular reactions in the system quinone - phenol
by the use of infrared vibration spectra. Izv. vys. ucheb. zav.;
fiz. no.4:171-172 '59.   (MIRA 13:3)

1.Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete
imeni V.V. Kuybysheva.
                    (Benzoquinone) (Phenol)

ANTIPOV, B.A.; ZUYEV, V.Ye.; KOKHANENKO, P.N.; SONCHIK, V.K.; FEDYUSHIN, A.A.

Transparency of a horisontal atmospheric layer in the range from 0.7 to 14 . Part 1: Equipment and measurement methods. Izv. vys.ucheb.zav.;fiz. no.2:105-110 '60.   (MIRA 13:8)

1. Sibirskiy fisiko-tekhnicheskiy institut pri Tomskom gosuniversitete im. V.V.Kuybysheva.
                    (Atmosphere—Optical properties)

82331

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S/139/60/000/03/011/045
B073/B335

AUTHORS: Antipov, B.A., Zuyev, V.Ye., Kokhanenko, P.N., Sonchik,
            V.K. and Fedyushin, A.A.

TITLE: Transparency of the Horizontal Layer of the Atmosphere
            in the Range of 0.7-14 μ. Part II. Dependence of the
            Total Transparency of the Atmosphere in the Range
            0.7-14 μ on the Thickness of the Precipitated Layer of
            Water

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
            1960, Nr 3, pp 72 - 75 (USSR)

ABSTRACT: The authors made an attempt to determine an empirical
            relation between the magnitude of the reduced signal   V
            (magnitude of the signal multiplied by a factor
            L_i^2/S_i :- L_i being the distance between the emitter and
            the receiver, S_i being the area of the emitter)
            and the air humidity which would show satisfactory
            agreement with experimental results obtained by the
            authors. As sources of infra-red radiation, four
            special emitters were used which were heated to 500 °C
            and placed at a distance of 1210, 3494, 6645 and 9855 m
            from the receiving equipment. The experimental set-up,
Card1/4

82331

S/139/60/000/03/011/045
E073/E514

Transparency of the Horizontal Layer of the Atmosphere in the Range
of 0.7-14 μ. Part II. Dependence of the Total Transparency of
the Atmosphere in the Range 0.7-14 μ on the Thickness of the
Precipitated Layer of Water

the method of carrying out the experiments and the
processing of the results were the same as those
described in an earlier communication (same journal,
No 2, pp 105-110). The air humidity and the intensity
of the signals were determined simultaneously. The
partial pressure of water vapours was determined directly
and then the thickness of the precipitated water layer
wL was calculated, where w - the thickness of the
precipitated layer of water in mm for 1 km and L - the
distance in km between the emitter and a receiver.
For detecting the relation between the air humidity
and the magnitude of the signal only those measurements
were taken into consideration which were carried out
in the absence of any visible clouding of the atmosphere
(mist, haze, fog, rain). Of a total of 811 determinations
only 140 complied with this condition. The experiments
were carried out during various days in March, April,

Card2/4

82331

S/139/60/000/03/011/045
EO73/E314

Transparency of the Horizontal Layer of the Atmosphere in the Range of 0.7-14 μ. Part II. Dependence of the Total Transparency of the Atmosphere in the Range 0.7-14 μ on the Thickness of the Precipitation Layer of Water

July, August, September, October and November, 1958 and encompassed a wide range of variation of air humidity; the value of w varied between 0.7 and 17 mm/km and the wL values varied between 0.8 and 167 mm. It was found that the magnitude of the reduced signal V is not a linear function of $\overline{wL}$ (see plot, Figure 1) but it appears that the dependence can be better expressed by a linear dependence of lg V on $\sqrt{wL}$. The following empirical relation was derived by the authors for the reduced signal V:

$$V = V_0 e^{-b\sqrt{wL}}$$

(2)

whereby V_0 is the magnitude of the reduced signal in the absence of water vapours in the air, b is a constant equalling in the given case 0.2319. Curves calculated according to this equation are in good

Cand3/4

82331

S/139/60/000/03/011/045
E073/E335

Transparency of the Horizontal Layer of the Atmosphere in the Range
of 0.7-14 μ. Part II. Dependence of the Total Transparency of
the Atmosphere in the Range 0.7-14 μ on the Thickness of the
Precipitation Layer of Water

    agreement with experimental data. The transparency
    T can be expressed by the relation:

$$T = e^{-b \sqrt{wL}}$$

    There are 5 figures.   (3) .

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri
    Tomskom gosuniversitete imeni V.V. Kuybysheva
    (Siberian Physico-Technical Institute at Tomsk
    State University imeni V.V. Kuybyshev)

SUBMITTED: July 29, 1959

Card 4/4

SOURCE CODE:

ACC NR: AP6002086

AUTHOR: Zuyev, V. Ye.; Tvorogov, S. D.

ORG: Siberian Physico-Technical Institute im. V. D. Kuznetsov (Sibirskiy Fiziko-tekhnicheskiy institut)

TITLE: Calculation of absorption functions for inhomogeneous beam paths

SOURCE: IVUZ. Fizika, no. 6, 1965, 84-86

TOPIC TAGS: atmospheric optics, absorption function, light attenuation, atmospheric scattering

ABSTRACT: Consideration of atmospheric transparency to inclined beams of light and the theory of radiation transfer in the atmosphere call for the computation of absorption functions for the case of variable pressure paths. In this connection, arguments are offered in favor of applying the method of weighted mean pressure $\bar{p}$

$$\bar{p} = \frac{\int_0^s \rho(s)\, p(s)\, ds}{\int_0^s \rho(s)\, ds},$$

to the problem of calculating the radiation absorption function $\Pi = A(m, \bar{p})$, where Π and A are absorption functions in the interval $\Delta\gamma = \nu'' - \nu'$ for the case of variable

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ACC NR AP6002086

and constant pressures along the beam path, ν is the frequency, and $m = \int \rho(s)ds$ for the case of a constant pressure along the light beam path. Results of calculations using the above formulas and numerical integration were compared and indicate that even under the most adverse conditions the relative error introduced by the derived formulas is of the oreder of 0.003 for spectral intervals of 0.1 μ and practically zero for larger spectral intervals. Orig. art. has: 12 formulas.   [YK]

SUB CODE: 04   SUBM DATE: 15Jul64/ ORIG REF: 001/ OTH REF: 005/ ATD PRESS:

Card   2/2

ZUYEV, V.Ye.

    Design and construction of industrial buildings should be based
on economic considerations. Uch. zap. Penz. inzh.-stroi. inst.
no.1:197-201 '61.   (MIRA 17:8)

ZUYEV, V.Ye.; KABANOV, M.V.; KOSHELEV, B.P.; TVOROGOV, S.D.;
KHMELEVTSOV, S.S.

Spectral transparency and microstructure of artificial fogs.
Part 2. Izv. vys. ucheb. zav.; fiz. no. 3:92-96 '64.
(MIRA 17:9)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom
universitete imeni Kuybysheva.

L 18908-66, SWT(1)/FCC GW

ACC NR: AP6002095   SOURCE CODE: UR/0139/65/000/006/0175/0177

AUTHORS: Zuyev, V. Ye.; Kabanov, M. V.

ORG: Siberian Physicotechnical Institute im. V. D. Kuznetsov   33
(Sibirskiy fiziko-tekhnicheskiy institut)   B

TITLE: Concerning some peculiarities of the attenuation of light in
the atmosphere

SOURCE: IVUZ. Fizika, No. 6, 1965, 175-177

TOPIC TAGS: atmospheric visibility, light scattering, atmospheric
stratification, light absorption

ABSTRACT: The authors report some results of an experimental investiga-
tion of the attenuation of light in three regions of the spectrum (0.43,
0.68, and 1.03 μ) and three horizontal layer thicknesses of the atmos-
phere at the surface of the earth (1.21, 3.65, and 9.86 km) at average
degrees of turbidity. The main purpose of these measurements was to
obtain experimental data on the laterally scattered radiation in the
real atmosphere at thicknesses of 3.65 km at small angular apertures of
the receiver, and comparing these data with theoretical results of
earlier work by the authors (Izv. Vuzov SSSR, Fizika No. 6, 1965 and

Card   1/3

L 18908-66

ACC NR: AP5002095

earlier papers). A special photometer with variable angular aperture
(0.01 -- 0.0025 rad) was used. The optical system of the photometer
is similar to that used in an artificial-fog camera and described by
the authors earlier (Izv. Vuzov SSSR Fizika, No. 1, 1964). The sections
of the spectrum were separated with interference and glass optical
filters. The half-width of the separated transmission bands was 20 --
30 nm for all the band centers indicated above. The light source was
a 3-kw floodlight placed 3.65 km from the receiver. The ratio of the
scattered to the direct radiation was calculated by extrapolation. The
attenuation coefficients per kilometer are defined as the ratio of the
signals for the distances 1.21 and 3.65 km (K_{12}) and the ratio of the
signals for 1.21 and 9.86 km (K_{13}). The values of the coefficients,
as well as the relative value of the diffuse radiation at unity optical
thickness (D) are tabulated for different sections of the spectrum. The
results show that the role of the laterally scattered light, for typical
average values of turbidity (visibility 10 -- 15 km), is variable and
depends on the content of large particles in the atmosphere during the
measurements. Anomalous variation of D (increase) with increasing wave-
length is likewise related with the particle size, and further tests on
the nature of this relation are being planned. Another observation that
calls for further research is the fact that the attenuation of the light-

Card   2/3

ACC NR: AP6002095

signal seems to be slower for large thicknesses of the atmosphere. The presence of a transparency maximum in the region 0.4 -- 1 micron can also be attributed to this hypothesis. Orig. art. has: 1 table. [02]

SUB CODE: 04/ SUBM DATE: 15Jul64/ ORIG REF: 001/ OTH REF: 002

Card 3/3 mc

ZUYEV, V.Ye.; TVOROGOV, S.D.

Informative announcement on the intercollegiate scientific
conference on the spectral transparency of the atmosphere
in the visible and infrared spectral regions. Izv. vys.
ucheb. zav.; fiz. 8 no.4:185-186 '65.

(MIRA 18:12)

1. Sibirskiy fiziko-tekhnicheskiy institut imeni V.D. Kuznetsova.
Submitted July 16, 1965.

L 19394-66   EWT(1)/FCC   GW/GS

ACCESSION NR: AT5011170

UR/0000/64/000/000/0223/0226

AUTHOR: Zuyev, V. Ye.; Nesmelova, L. I.; Sapozhnikova, V.A.; Tvorogov, S. D.

TITLE: Calculations of atmospheric transparency for infrared radiation

SOURCE: Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery. 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 223-226

TOPIC TAGS: infrared radiation, atmospheric water vapor, atmospheric transparency, atmospheric light absorption, atmospheric optics

ABSTRACT: Precise computation of the absorption coefficient and the absorption function for the infrared absorption spectra of the principal absorbing components of the atmosphere is discussed. Such computations require knowledge of a large number of parameters char-acterizing both the molecule whose absorption spectrum is radiated and the transitions causing the presence of these lines and bands. Since much computation work is involved, simplification has been sought by using models of absorption bands. In this paper, the quasi-statistical model is used (V. R. Stull, P. J. Wyatt, G. N. Plass, Final report of the theoretical study of infrared radiative behavior of flames, 1961). In this approach, the

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L 19394-66
ACCESSION NR: AT5011176

statistical model is applied to a quite narrow spectral range so that, within this interval, any position of lines is equi-probable. The values for water vapor, carbon dioxide and ozone used in this paper were taken from the literature. Computations of absorption in the ozone band were made for heights of 10 and 21 km. The results are shown in Figures 1-4 of the Enclosure. Figures 1 and 2 show the spectrum of the water vapor and carbon dioxide bands (with overlapping taken into account) for pressures of 1 and 0.3 atm. Fig. 3 shows the absorption spectrum of water vapor for different pressures. Fig. 4 shows the absorption of carbon dioxide. Orig. art. has: 4 figures.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete (Siberian Physics and Technology Institute at Tomsk State University)

SUBMITTED: 25Nov64   ENCL: 04   SUB CODE: ES

NO REF SOV: 001   OTHER: 004

Card   2/6

L 19394-66
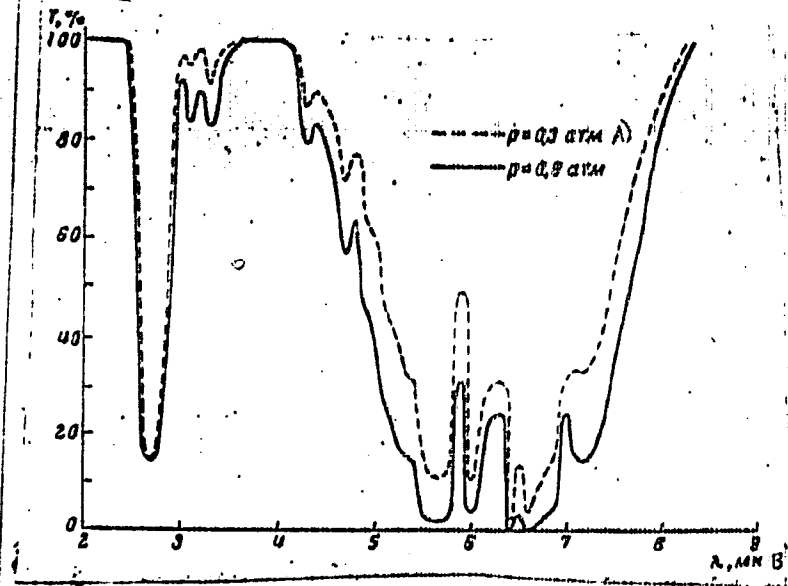ACCESSION NR: AT5011176

ENCL: 01

Fig. 1. Spectral transmission of radiation in the range 2-8.5μ by water vapor bands for a precipitable layer of water ℓ = 0.2 cm for two pressures at heights of 10 and 1 km. A) atm; B) μ.

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L 19394-66
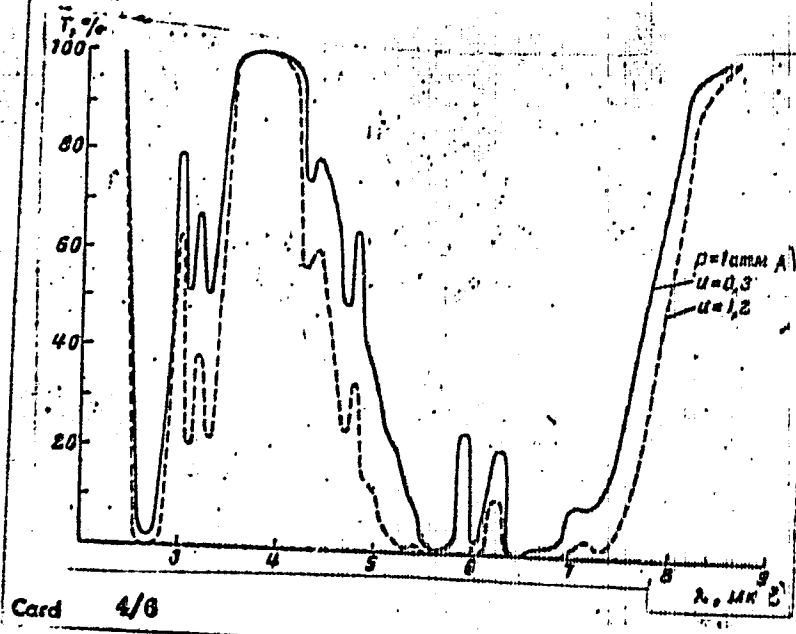ACCESSION NR: AT5011176

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Fig. 2. Spectral trans-
mission of radiation in
the range 2-8.5μ by water
vapor bands in the surface
layer for two values of
the precipitable layer of
water; A) atm; B) μ.

$p = 1$ atm A
$u = 0.3$
$u = 1.2$

$\lambda, \mu\kappa$ B

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L 19394-66
ACCESSION NR: AT6011176

ENCL: 03
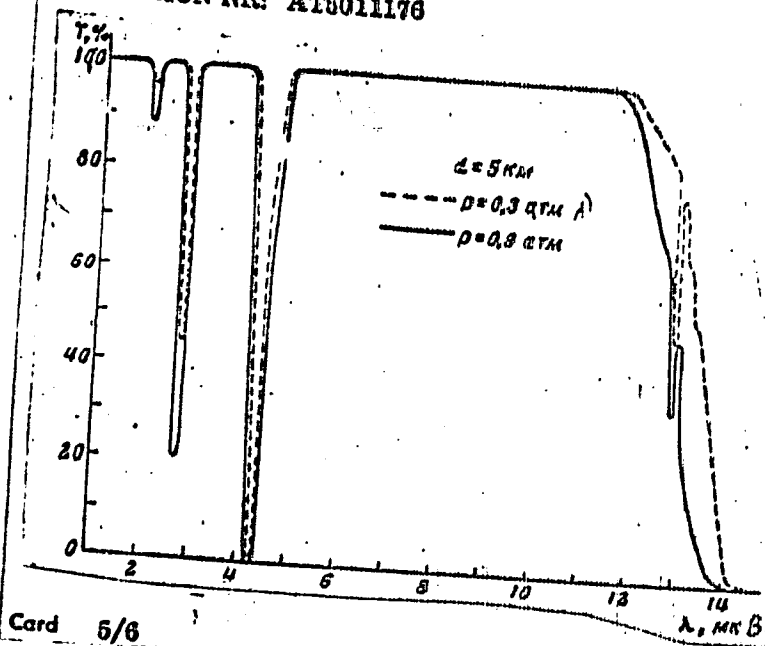
Fig. 3. Spectral trans-
mission of radiation in
the range 1-15μ by carbon
dioxide bands at a dis-
tance d = 5 km at heights
of 10 and 1 km, A) atm;
B) μ.

Card   5/6
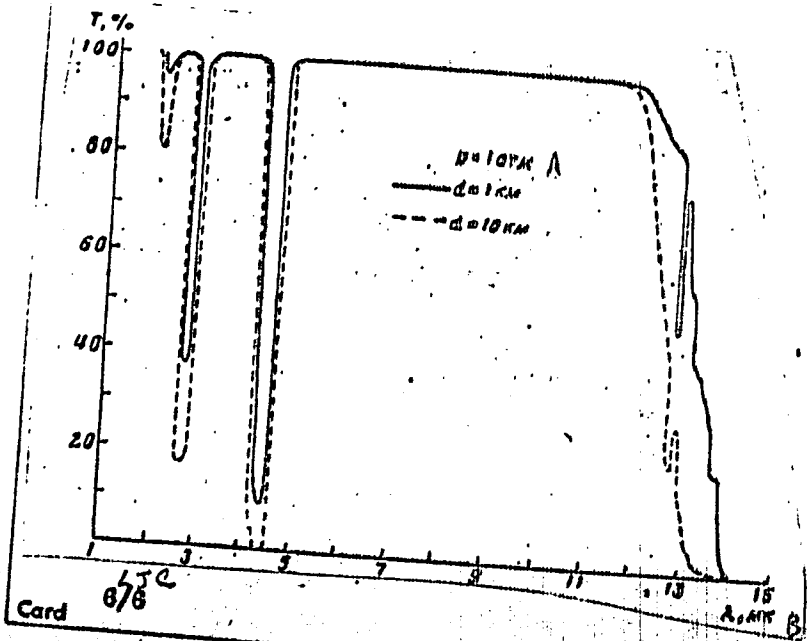
L 19394-66
ACCESSION NR: AT5011176

ENCL: 04

Fig. 4. Spectral trans-
mission of radiation in
the range 1-18μ by carbon
dioxide bands in the sur-
face layer at a distance
d = 1 and 10 km. A) atm;
B) μ.

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KABANOV, M. V.; KOSHELEV, B. P.; TVOROGOV, S. D.; KHMELEVTSEV, S. S.

"The influence of microstructure parameters of clouds and fogs on their spectral transmission in Region 0.5-14 Microns."

paper presented at the Atmospheric Radiation Symp, Leningrad, 5-12 Aug 64.

ZUYEV, V.Ye.; KABANOV, M.V.; BOROVOY, A.G.

Extinction of a light signal in a dispersive medium. Part 1. Izv. vys.
ucheb. zav.; fiz. no.6:162-167 '63.

(MIRA 17:2)

1. Sibirskiy fiziko-tek nicheskiy institut pri Tomskom gosudarstvennom
universitete imeni Kuybysheva.

ZUYEV, V.Ye.; KABANOV, M.V.; SAVEL'YEV, B.A.

Damping of a light signal in a disp~~~tve m~d um. Part 3. Izv.
vys. ucheb. zav.; fiz. no.5:80-85 '64.

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarst-
vennom universitete imeni Kuybysheva.   (MIRA 17:11)

ZUYEV, V.Ye., kand. tekhn. nauk

Engineering method of designing T-sewer pipes for high-pressure
pipelines. Uch. zap. Penz. inzh.-stroi. inst. no.2:39-76 '62.
(MIRA 17:11)

85163

S/139/60/000/005/013/031
E073/E535

6.3100 (also 2201, 2801)

AUTHORS: Zuev, V. Ye., Elyashberg, M.Ye. and Safonova, G.A.

TITLE: Transparency of Thin Atmospheric Layers in the Range
             1 to 13 microns

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
             1960, No.5, pp. 77-81

TEXT: In most work published until now two approximate laws
of attenuation are applied, one is the exponential law, the other
the square root law. It is of interest to make use of the available
experimental material to choose analytical expressions which would
approximate satisfactorily the attenuation law. Of particular
interest are investigations for small values of w (depth of the
water layer) of the order of 10^{-5}, 10^{-3} cm, since it is particularly
for this range of values that the formation of the basic absorption
bands is most intensive. Investigation of the spectral integral
transparency of thin layers of the atmosphere is of interest due to
the fact that in measuring the absolute transparency over large
distances it is usually assumed, without adequate justification,
that absorption of the radiation in the reference channel over a

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85163

S/139/60/000/005/013/031
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Transparency of Thin Atmospheric Layers in the Range 1 to 13 microns

distance of a few metres can be disregarded. The aim of the work described in the paper was to elucidate the possibility of application of these laws to the attenuation of infrared radiation for W between 10^{-5} and 10^{-3} cm and also to obtain quantitative data on the spectral and integral transparency of thin atmospheric layers, up to 3 m in the range of 1 to 13 microns. All the investigations were carried out on an ИКС-6 (IKS-6) spectrometer with NaCl prisms, an amplifier and recording equipment. To eliminate water vapour and CO_2 from the path of the radiation beam between the source and the thermocouple, the light source and the cuvette of the spectrometer were evacuated, the monochromator and other parts of the path were blown through with dry nitrogen. Thus, water vapour and CO_2 were completely eliminated from the path of the beam and it was possible to record the total transparency curve or the spectral curve of radiation from the source for spacings between 5 and 300 cm. From the curve of the total transparency and the absorption curves for the various distances, it was possible to determine the transparency curve. Two series of measurements were made, in the first one

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85163

S/139/60/000/005/013/031
E073/E535

Transparency of Thin Atmospheric Layers in the Range 1 to 13 microns

absorption spectra of atmospheric water vapours and CO_2 were measured for spacings of 5, 20, 40, 60, 235, 255, 275 and 300 cm for a given absolute humidity. In the second series the absorption of the radiation was measured for a fixed spacing of 2.35 m for absolute humidities of 7.5, 10.12 and 14.5 millibars; the magnitude of the precipitated water varied between 10^{-5} and 2.5×10^{-3} cm. All the spectrum recordings were for the range 1 to 13 microns under laboratory and natural atmospheric conditions. No absorption was detected in the range 8 to 13 microns, which is fully in accordance with literary data (Ref.3). To verify the possibility of application of the exponential law and the square root law for expressing the attenuation of infrared radiation, graphs of $\ln T$ versus w and T versus $\sqrt{w}$ were plotted for all the peaks of the absorption bands 2.7 and 6.3 microns, which are due to water vapour ($T = 1-A$ is the transparency for the peak under consideration). It was found that in the range 10^{-3} to 2.5×10^{-3} cm the attenuation can be satisfactorily described by the exponential law as well as by the square root law. If w drops below 10^{-3} cm, the exponential law will no longer be fulfilled and the same applies to the square root law from a value of
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S/139/60/000/005/013/031
E073/E535

Transparency of Thin Atmospheric Layers in the Range 1 to 13 microns

$w \cong 5 \times 10^{-4}$ cm. Additional experimental data will be required for deriving an analytical expression which approximates satisfactorily the behaviour of attenuation for layers thinner than 10^{-4} cm. The spectral transparency curves were plotted for various quantities of precipitated water in the range of 1 to 8 microns. This range can basically be sub-divided into two spectral ranges of 1 to 4 microns and 4 to 8 microns. In the first range absorption is basically at $^{\circ}.7$ microns, in the second range there is a wide absorption band with a centre at 6.3 microns for water vapours and a band at 4.3 microns for CO_2. It can be seen from the curves that to disregard the absorption of radiation along a few metres and even along fractions of a metre is permissible only for well defined spectral ranges but not for the entire spectral range. Laboratory results are compared with results obtained under natural conditions. A new clearly pronounced water vapour absorption band was observed in the range 2.5 to 3.3 microns, which is due to some absorption agent in the free atmosphere. In spite of some differences in the spectra obtained under laboratory and under natural conditions, the

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E073/E535

Transparency of Thin Atmospheric Layers in the Range 1 to 13 microns

integral absorption measured under laboratory conditions differed only slightly from those measured under natural conditions. There are 3 figures, 1 table and 3 references: 1 Soviet and 2 English.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V. V. Kuybysheva (Siberian Physics and Engineering Institute, Tomsk State University imeni V. V. Kuybyshev)

SUBMITTED: December 24, 1959

Card 5/5

6.3200

AUTHORS: Antipov, B.A., Zuyev, V.Ye., Kokhanenko, P.N.,
Sonchik, V.K. and Fedyushin, A.A.

TITLE: Transparency of the Horizontal Layer of the Atmosphere
in the Region 0.7 to 14 μ.   III. Dependence of the
Total Transmission of the Atmosphere in the Region
0.7 to 14 μ on the Thickness of the Precipitated Layer
of Water

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
1961, No.1, pp.17-19

TEXT: In previous papers (Refs.1 and 2) the present authors
described an apparatus and a method of measurement of the
transparency of the atmospheric layer next to the earth surface in
the region 0.7 to 14 μ and for distances between 1.21 and 9.86 km.
The experimental material obtained was also reported.   In the
present paper additional data recently obtained are reported.
As an approximation, the magnitude of the transmitted signal was
described in Ref.2 by the exponential law

$$v = v_0 e^{-a\sqrt{wL}}$$ (1)

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89693

S/139/61/000/001/001/018

Transparency of the Horizontal ...   E032/E414

where w is the thickness of the precipitated water in mm per km,
L is the distance traversed by the radiation in km, a is a
constant and v_0 is the intensity in the absence of the absorbing
medium.   Eq.(1) was obtained empirically and gave a sufficiently
good representation of the experimental results.   This expression
accounts for the absorption of the infrared radiation by water
vapour only and does not take into account absorption by carbon
dioxide or effects due to atmospheric turbidity.   The criterion
for the applicability of Eq.(1) is the linear dependence between
lg v and $a\sqrt{wL}$.   The new data now reported are also well
represented by Eq.(1) right up to wL = 90 mm.   However, for
greater values of wL, the dependence between lg v and $\sqrt{wL}$ is no
longer linear and in order to describe all the experimental data
the following formula was employed

$$v = \frac{c}{1 + wL} + k \qquad\qquad (2)$$

where c and k are constants.   This expression is also purely
empirical and the criterion for its applicability is a linear
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89693

S/139/61/000/001/001/018
E032/E414

Transparency of the Horizontal ...

relation between v and $(1 + wL)^{-1}$. Fig.2 shows the dependence of v on wL. During the measurements the sensitivity of the receiving apparatus was controlled by a 6 watt lamp at a distance of 5 m from the detector. It was found that the signal due to the lamp was very dependent on the humidity of the air. It is therefore pointed out that the use of a standard source at a short distance from the receiver may introduce errors unless corrections for the humidity are introduced. There are 2 figures and 2 Soviet references.

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             gosuniversitete imeni V.V.Kuybysheva
             (Siberian Physicotechnical Institute of the Tomsk
             State University imeni V.V.Kuybyshev)

SUBMITTED: February 13, 1960

Card 3/4

89693

Transparency of the Horizontal ...   S/139/61/000/001/001/018
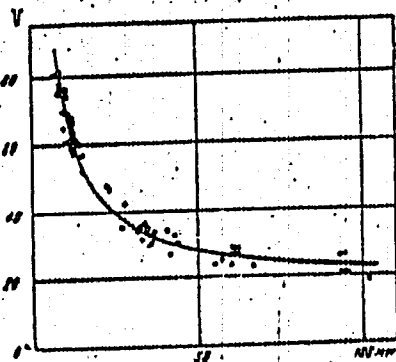E032/E414

Fig.2.

Рис. 2.

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ACCESSION NR: AP4036563   S/0139/64/000/002/0090/0097

AUTHORS: Zuyev, V. Ye.; Kabanov, M. V.; Koshelev, B. P.; Tvorogov, S. D.;
Khmelevtsov, S. S.

TITLE: Spectral transparency and microstructure of artificial fog. 1

SOURCE: IVUZ. Fizika, no. 2, 1964, 90-97

TOPIC TAGS: fog, spectral transparency, infrared spectrometer, photometer, droplet
concentration, water content, spectrometer IKS 6, photometer FEU 22

ABSTRACT: The details of an experimental analysis in the study of artificial fog
microstructure and spectral transparency are presented. All measurements were made
in artificial fog created by evaporation in a 15^{-3} m chamber. An IKS-6 infrared
spectrometer was used to determine transparency in the region 2-15 μ, and a
photometer FEU-22 was used to determine the transparency in regions 0.42, 0.68, 0.94
and 1.03 μ with 20-30 m μ width. Probes were placed in the chamber to determine
droplet concentration, droplet distribution functions and parameters, and water
content of the mist. The instruments included flow traps of shaft and reel type,
curvilinear flow traps for fine-droplet capture, and optical instruments with remote
control. An attempt was made to measure spectral transparency simultaneously with

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ACCESSION NR: AP4036563

taking microstructure measurements determined from parameters:

$$q = \frac{\pi}{6} \sum_i n_i d_i^3 \; ; \quad d_2 = \sqrt{\frac{\Sigma n_i d_i^2}{\Sigma n_i}} \; ; \quad d_3 = \sqrt[3]{\frac{\Sigma n_i d_i^3}{\Sigma n_i}} \; .$$

where q - water content of fog, d_2 - mean squared diameter, d_3 - mean cubic diameter, n_1 - droplet concentration. The results show that (for droplets with diameters greater than 3 μ) the capture coefficient of curvilinear flow traps is unity. A parameter was found for correlating the microstructure data given by: $k_{0.42}/2S_g = C$, where S_g - geometric cross section of droplet per unit volume, $k_{0.42}$ - attenuation coefficient, and C varies between 1 and 7. A graph of $k_\lambda/k_{0.42}$ versus λ for $d_2 = 14 \mu$ shows a "transmission window" in the vicinity of 10 μ. This "window" moves towards larger wavelengths as the droplet mean squared diameter increases. Orig. art. has: 4 figures, 2 formulas, and 1 table.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V. V. Kuyby*sheva (Siberian Physicotechnical Institute, Tomsk State University)

SUBMITTED: 04Jun63

SUB CODE: ES   DATE ACQ: 05Jun64

Card 2/2   NO REF SOV: 013   ENCL: 00

                                                             OTHER: 003

9.9822

26023   S/139/61/000/003/003/013
            E032/E314

AUTHOR: Zuyev, V.Ye.

TITLE: Integral Absorption Functions for Long-wavelength
           Radiation in the Atmosphere
           I. Method of Calculation of Integral Functions for
           Atmospheric Absorption by Water Vapour and CO_2 Using
           Laboratory Data on Absorption in Isolated Bands

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
               1961, No. 3, pp. 28 - 34

TEXT: The present author gives a method for the calculation
of integral absorption functions for long-wavelength radiation
in the case of water vapour or CO_2 in horizontal layers of the
atmosphere for a source with known spectral-intensity distri-
bution. The method is based on the accurate experimental data
reported by J.N. Howard, D.E. Burch and D. Williams in Ref. 6
(Journ. Opt. Soc., 46, No. 3, 4, 1956), which were obtained
under rigorously controlled laboratory conditions. The
integral absorption function for water vapour or CO_2 can be
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26023   S/139/61/000/003/003/013
Integral Absorption Functions ... E032/E314

written down in the form

$$A = \sum_i P_j A_j \tag{5}$$

where P_j is the intensity incident on the absorbing layer in the spectral interval occupied by the j-th band and A_j is the absorption function for the band, given by

$$A_j = \frac{\int r_\nu A_\nu d\nu}{\int r_\nu d\nu} \tag{6}$$

where $A_\nu = 1 - T_\nu$,

T_ν is the spectral transmittance,

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Integral Absorption Functions ... 26923   S/139/61/000/003/003/013
                                              E032/E314

r_ν is the spectral density of the source, and

ν_1, ν_2 are the limits of the band.

It can be shown that, for a perfectly black or grey body the calculation of the absorption functions for the main rotational-vibrational bands of water vapour or CO_2 can be carried out with sufficient accuracy by assuming that r_ν = const. In that case,

$$A_j = \frac{\int_{\nu_1} A_\nu\, d\nu}{\Delta\nu},$$

$$\Delta\nu = \nu_2 - \nu_1.$$

(7)

and the values of $\int_{\nu_1}^{\nu_2} A_\nu\, d\nu$ and $\Delta\nu$ are tabulated in Ref. 6.

The error introduced by replacing Eq. (6) by Eq. (7) can be

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Integral Absorption Functions ...   26923   S/139/61/000/003/003/013
E032/E314

estimated from the following formulas

$$\frac{\int r_\nu A_\nu\, d\nu}{\int r_\nu\, d\nu} \cdot \frac{\int A_\nu\, d\nu}{\Delta\nu} = A_1 - A_2;$$

$$A_1 - A_2 = \frac{\bar r_\nu \int A_\nu\, d\nu}{\int r_\nu\, d\nu} \cdot \frac{\int A_\nu\, d\nu}{\Delta\nu} = A_2\left(\frac{\bar r_\nu \Delta\nu}{\int r_\nu\, d\nu} - 1\right);$$

$$A_1 = A_2\frac{\bar r_\nu \Delta\nu}{\int r_\nu\, d\nu} = cA_2; \qquad c = \frac{\bar r_\nu \Delta\nu}{\int r_\nu\, d\nu};$$

(8)

where $\bar r_\nu$ is the average value of r_ν in the range $\Delta\nu$. When r_ν = const., we have $c = 1$ and $A_1 = A_2$. However, in general, $r_\nu \neq$ const. and the quantity c will represent the error introduced by the above assumption. Calculations show

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Integral Absorption Functions S/139/61/000/003/003/013
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that the errors due to the replacement of Eq. (4) by Eq. (7)
are negligible in the case of an absorption band having a
symmetrical form, although it increases as the asymmetry
increases. In general, the simplifying assumption does not
introduce errors greater than 3-5%. The paper is concluded
with a general discussion of the various effects which have
to be taken into account in practice, namely:
1) the effect of the total and partial pressures;
2) the effect of the temperature and composition of the
atmosphere;
3) asymmetry of absorption lines and their overlap;
4) the effect of the spectrometer parameters.
It is claimed that the present method gives a higher
accuracy than those used so far. There are 2 figures and
9 references: 4 Soviet and 5 non-Soviet. The four latest
English-language references quoted are: Ref. 2: R.M. Goody.
Quart. Journ. Roy. Met. Soc., 78, No. 336, 1952;
Ref. 3: F. Matossi, R. Mayer, E. Rauscher - Phys. Rev., 76,
No. 6, 1949; Ref. 6 (quoted in text); Ref. 9 - J.R. Nilsen,

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Integral Absorption Functions 2*023 S/139/61/000/003/003/013
E032/E314

V. Thornton and E.B. Dale - Rev. Mod. Phys., 16, 307, 1944.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut
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(Siberian Physicotechnical Institute at
Tomsk State University imeni V.V. Kuybyshev)

SUBMITTED: April 20, 1960

Card 6/6

ZUYEV, V. Ye.

Integral functions of the absorption of long-wave radiation
in the atmosphere. Part 4. Absorption by water vapors and
CO_2. Izv. vys. uch. zav.; fiz. 3:49-54 '62.

(MIRA 15:10)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosu-
darstvennom universitete imeni V. V. Kuybysheva.

(Solar radiation)   (Water vapor)
(Carbon dioxide)

34154

S/139/61/000/006/014/023

E032/E514

9,9822 (also 2303)

AUTHOR: Zuyev, V. Ye.

TITLE: Integral absorption functions for long-wavelength radiation in the atmosphere. II. Absorption by atmospheric CO_2

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no. 6, 1961, 109-116

TEXT: The absorption functions for atmospheric CO_2 in a horizontal layer were calculated from the formula

$$A_j = \frac{\int_{\nu_1}^{\nu_2} A_\nu \, d\nu}{\Delta\nu} \qquad (1)$$

where A_j is the integral absorption function for the j-th band, $\int_{\nu_1}^{\nu_2} A_\nu \, d\nu$ is the integral absorption in that particular band, and

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Integral absorption functions ...   S/139/61/000/00 /014/023

34194

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$\Delta \nu = \nu_2 - \nu_1$ is the spectral interval occupied by the band. The method was described in detail by the present author in Part I of this paper (Ref.1: Izv.vuzov, Fizika, No.3, 1961). The magnitude of the integral absorption was calculated from the empirical formulae reported by J. N. Hovard, D. E. Burch and D. Williams (Ref.2: Journ.Opt.Soc.Am., 46, No.3, 4, 1956) and the values of $\Delta \nu$ were taken from that paper. In addition to the integral absorption functions for CO_2, the author has also calculated the fraction of total black-body radiation absorbed by each CO_2 band in the following range of black-body temperatures: -25 to 2000°C. The integral absorption function for all the CO_2 bands was calculated from the formula

$$A = \sum_j A_j P_j \qquad (2)$$

All the calculations were carried out for a CO_2 concentration of 0.03% by volume and distances in the range 0.1 to 50 km. The calculations were carried out for CO_2 bands with centres near

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Integral absorption functions ...   S/139/61/000/006/014/023
                                      E032/E514

1.4, 1.6, 2.0, 2.7, 4.3, 4.8, 5.2 and 15.0 μ.   Tables of the
results obtained are reproduced.   Inspection of these tables
shows that the 15, 4.3 and 2.7 μ bands play the main role in the
absorption of long-wavelength radiation by atmospheric CO_2.
Absorption in the 1.4 and 1.6 μ bands can be neglected, while
the remaining bands need only to be taken into account in isolated
cases.   The fraction of black-body radiation absorbed in the
15 μ band may, under certain conditions, reach as much as 25 or
26%.   The usually accepted value (Ref.3: K.Ya.Kondrat'yev.
Radiative heat transfer in the atmosphere, Gidrometooizdat, 1956)
for this band is said to be 14%.   The discrepancy is said to be
due to the inaccurate determination of the limits of this band
in earlier work.   Fig.1 shows the integral absorption function for the
4.3 μ band as a function of distance for different source tempera-
tures.   Table 5 gives the values of the integral absorption
functions (in %) for all the above absorption bands.   There are
1 figure, 5 tables and 3 references: 2 Soviet-bloc and 1 non-Soviet-
bloc.   The English-language reference is quoted in the text.
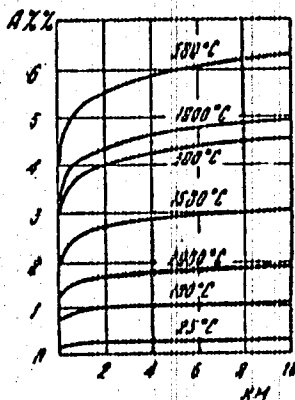
Card 3/8 4

34134

Integral absorption functions ...   S/139/61/000/006/014/023
E032/E514

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom
gosuniversitete imeni V. V. Kuybysheva
(Siberian Physico-technical Institute of the Tomsk
State University imeni V. V. Kuybyshev)

SUBMITTED: December 3, 1960

Fig.1

Card 4/64

ZUYEV, V.Ye.; KOSHELEV, B.P.

Effect of the spectrometer slit width on the measurable
spectral and integral absorption. Izv. vys. ucheb. zav.; fiz
no.6:172-173 '61.   (MIRA 15:1)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom
gosudarstvennom universitete imeni Kuybysheva.
                        (Spectrometry)

ZUYEV, V.Ye.; TVOROGOV, S.D.

Absorption function of an individual spectral line in a finite
interval. Izv. vys. ucheb. zav.; fiz. 8 no.1:185-186 '65.
(MIRA 18:3)

1. Sibirskiy fiziko-tekhnicheskiy institut imeni akademika
Kuznetsova.

3,5154

AUTHOR: Zuyev, V.Ye.

TITLE: Integral absorption functions for long-wavelength
            radiation in the atmosphere. III Absorption by
            water vapour

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
               no. 1, 1962, 125 - 129

TEXT: The author reports a calculation of the integral
absorption functions for the principal vibration-rotation
absorption bands of water vapour, in accordance with the method
described in an earlier paper (Ref. 1 - Izv. vuzov SSSR, Fizika,
no. 2, 1961). The temperature of the sources of radiation was
taken to be -25, 0, 25, 50, 100, 300, 500, 750, 1 000, 1 500
and 2 000 °C and the vibration-rotation bands considered were
0.94, 1.1, 1.38, 1.87, 2.7, 3.2, 6.3 μ and the 3.7 μ band of
HDO. Detailed numerical tables are reproduced. It is found
that the integral absorption associated with all the above bands
of water vapour, except for the 3.7 μ HDO band, should be taken

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Integral absorption ....

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E032/E314

into account in calculations of integral absorption functions.
The only exception is when the spectral interval occupied by
the corresponding band at a given source temperature comprises
a small fraction of the total energy radiated by the source.
Moreover, the maximum contributions due to the 1.87, 1.38 and
3.7 μ bands at a source temperature of 300 °C are less than
0.1%. The contributions due to the 1.1 and 0.94 μ bands
are even smaller. At a source temperature of 500 °C, contri-
butions due to the 1.38 and 3.7 μ bands are less than 0.1%.
The contribution due to the 1.1 and 0.94 μ bands at this
temperature can be neglected. At 750 °C the maximum contributions
due to the 3.7, 1.1 and 0.4 μ bands are, respectively, less than
0.13, 0.04 and 0.01%. At 1 000 °C the corresponding figures for
the 1.1, 3.7 and 0.94 μ bands are 0.18, 0.11 and 0.05%.
Finally, at source temperatures of 1 500 and 2 000 °C the
contribution to the 3.7 μ band is less than 0.08 and 0.05%
respectively. It is clear from the results reported in this
paper that there is a redistribution of the importance of the

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Integral absorption ....

$S/139/62/000/001/020/032$
$E032/E314$

various bands, depending on the source temperature and the magnitude of the precipitated layer ω . Table 8 gives the values of the integral-absorption function, including contributions due to all the principal bands of wavor vapour for different values of ω and source temperature.
There are 8 tables.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri
Tomskom gosuniversitete imeni V.V. Kuybysheva
(Siberian Physicotechnical Institute of
Tomsk State University imeni V.V. Kuybyshev)

SUBMITTED: December 13, 1960

Card 3/4

ZUYEV, V.Ye.; KABANOV, M.V.

    Attenuation of a light signal in a dispersive medium. Part 2.
    Izv. vys. ucheb. zav.; fiz. no.1:168-172 '64.   (MIRA 17:3)

    1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom
    universitete imeni Kuybysheva.

ACCESSION NR: AP4025099   S/0139/63/000/006/0162/0167

AUTHORS: Zuyev, V. Ye.; Kabanov, M. V.; Borovoy, A. G.

TITLE: Decay of light signals in scattering media. 1. Calculation results of single scattering in the direction of radiation

SOURCE: IVUZ. Fizika, no. 6, 1963, 162-167

TOPIC TAGS: single scattering, radiation source, mean free path, characteristic-curve, water-particle transmittivity

ABSTRACT: To determine the single scattering magnitude of D, a function of the cone angle of radiation source θ, given by

$$D = \frac{1}{2} \int_0^\theta \int_0^\psi \beta(\rho, \psi + \theta) \, d\psi d\theta.$$

where ψ – aperture of collector, $\rho = 2\pi a/\lambda$, a – particle radius, and λ – mean free path, has been determined for various values of ψ and θ. The characteristic-

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ACCESSION NR: AP4025099

curve expression for spherical water-particle transmittivity, and for values of P :: $P \to 0$, $1 \leqslant P \leqslant 30$, and $P \doteqdot 30$ have been used. The results of calculations were compared with existing experimental values and were found to be satisfactory. Orig. art. has: 12 equations, 3 figures, and 1 table.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V. V. Kuybysheva (Siberian Physicotechnical Institute, Tomsk State University)

SUBMITTED: 30May62   DATE ACQ: 14Feb64   ENCL: 00

SUB CODE: PH   NO REF SOV: 004   OTHER: 005

Card 2/2

ACCESSION NR: AP4020311   S/0139/64/000/001/0168/0172

AUTHORS: Zuyev, V. Ye.; Kabanov, M. V.

TITLE: Attenuation of a light signal in a scattering medium. 2. Experimental
investigations in cloud chambers

SOURCE: IVUZ. Fizika, no. 1, 1964, 168-172

TOPIC TAGS: light, light signal, attenuated light signal, light scattering, cloud
chamber, scattering ratio, side scattering, optical thickness, single scattering,
monodisperse system, polydisperse system

ABSTRACT: This paper contains results of experimental testing on the limits of
applicability of a formula derived previously by the same two authors and
A. Borovoy (Izv. vuzov SSSR, Fizika, no. 6, 1963) on attenuation of a signal from
a point source. By means of a special photometer and a continuous trap, optical
and microphysical determinations were made, and these show a proportional depen-
dence of the scattering ratio of side to direct radiation on the optical thickness.
Values of attenuation were computed for different values of angular aperture and
other parameters. Experiments on scattering by small particles (tobacco smoke)

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ACCESSION NR: AP4020311

have shown that side scattering is much less for these particles than for large particles (in the cloud). The ratio of side to direct scattering is proportional to optical density up to a thickness of 2.5. A comparison of experimental data with computations shows good quantitative agreement. This furnishes grounds for stating that (1) the comparison of attenuation obtained for a monodisperse system of scattering particles with that for a polydisperse system according to mean- square diameter (with bell-shaped particle-size distribution, as in these experi- ments) is justified, and (2) the computation of side-scattered radiation may be made according to data of the theory of single scattering, at least to an optical thickness of 1.5 for large particles (about 8 microns) and to an optical thickness up to 2.5 for small particles (about 0.2 micron). Orig. art. has: 4 figures and 2 formulas.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosuniversitete imeni V. V. Kuybysheva (Siberian Physicotechnical Institute at Tomsk State University)

SUBMITTED: 30May63   DATE ACQ: 31Mar64   ENCL: 00

SUB CODE: PH   NO REF SOV: 003
                                                                       OTHER: 000

Card 2/2

ZUYEV, V.Ye.

Effect of the temperature source on the significance of integral
absorption functions of long-wave radiation in the surface layer
of the atmosphere. Trudy Astrofiz.inst.AN Kazakh.SSR 3:67-71 '62.
(MIRA 16:11)

S/139/62/000/003/007/021
E032/E314

AUTHOR: Zuyev, V.Ye.

TITLE: Integral absorption functions for long-wave
          radiation in the atmosphere
          IV. Absorption by water vapour and CO_2

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,
          no. 3, 1962, 49 - 54

TEXT: The integral absorption functions are computed using the
method described earlier (V.Ye. Zuyev - Izv. vuzov, Fizika, no.3,
1961), with allowance for the overlap of the absorption bands of
water (0.94, 1.1, 1.38, 1.87, 2.7, 3.2, 6.3 μ) and CO_2 (1.4, 1.6,
2.0, 2.7, 4.3, 4.8, 5.2, 15.0 μ). Fig. 2 shows the results
obtained for the absorption function (black-body source at 298 $^\circ$K).
Curve 1 shows the contribution due to CO_2; curves 2, 3 and 4
represent the contribution due to the integral absorption by
water vapour at humidities corresponding to 0.25, 0.1 and 0.5 cm
per kilometre of path. It is clear that CO_2 absorption makes

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Integral absorption S/139/62/000/003/007/021
                             E032/E314

a large contribution and that the integral absorption function rapidly increases with distance in the first kilometre traversed by the radiation. The calculations can be easily extended to sources at other temperatures and the results can be used to calibrate various radiation receivers under the conditions of good visibility, and to separate experimental attenuations in the atmosphere into the components associated with absorption and scattering. There are 2 figures and 2 tables.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri
                 Tomskom gosuniversitete imeni V.V. Kuybysheva
                 (Siberian Physicotechnical Institute of Tomsk
                 State University imeni V.V. Kuybyshev)

SUBMITTED: December 20, 1960

Card 2/2

9.9822,
3.5110

S/139/62/000/004/005/018
E032/E514

AUTHORS: Galibina, L.I. and Zuyev, V.Ye.

TITLE: Absorption of long-wavelength radiation by water vapour and CO_2 bands along oblique directions in the atmosphere

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no.4, 1962, 69-74

TEXT: In a previous paper (Izv.vuzov SSSR, Fizika, no.3, 1961) the second of the present authors showed that the semi-empirical formulae given by J. N. Howard, D. E. Burch and D. Williams (J.Opt.Soc.Am., 46, No.3, 4, 1956) can be used to compute the absorption of long-wavelength radiation in a real atmosphere. However, in the case of oblique propagation these expressions cannot be used immediately because the total and partial pressures which enter into them are functions of altitude. It is, therefore, necessary to know the functional form of the altitude dependence of these pressures. It is now shown that the integral absorption of long-wavelength radiation in the water vapour and CO_2 bands can be computed using the Howard-Burch-
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Absorption of long-wavelength ...   S/139/62/000/004/005/018
                                      E032/E514

Williams expressions:

$$\int_{\nu_1}^{\nu_2} A_\nu d\nu = c\omega^{1/2}(P + p)^k,$$ (1)

$$\int_{\nu_1}^{\nu_2} A_\nu d\nu = C + D \log \omega + K \log (P + p),$$ (2)

with the concentration ω and total pressure P of water vapour
given by

$$\omega = \frac{a_o}{2 \ln 10} (1 - 10^{-h/5})$$ (7)

$$P = \frac{1}{h} \int_o^h P_o e^{-z/8} dz = \frac{8P_o}{h} (1 - e^{-h/8}).$$ (8)

In the case of CO_2 the vapour concentration is given by

$$\omega = 240(1 - e^{-h/8})$$ (10)

and the total pressure by Eq.(8). These expressions hold for
vertical propagation in the atmosphere and must be multiplied by
$1/\cos \varphi$ in the case of oblique incidence, where φ is the zenith
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Absorption of long-wavelength ...   S/139/62/000/004/005/018
                                       E032/E514

angle. The authors have carried out numerical calculations for
heights up to 8 km and six different zenith angles. Full
numerical tables are given for the absorption functions computed
from

$$A = \frac{\int_{\nu_1}^{\nu_2} A\nu \, d\nu}{\nu_2 - \nu_1}$$ (12)

for the following bands of CO_2 and H_2O vapour: (15, 5.2, 4.8, 4.3,
2.7, 2.0, 1.6, 1.4µ) and (6.3, 3.2, 2.7, 1.87, 1.38, 1.1, 0.94,
3.7 µ) respectively. The CO_2 calculations refer to the following
values of the zenith angle: 0, 15, 30, 45, 60 and 75°, while
those for water vapour refer to the following absolute humidities:
0.5, 1.0, 2.0, 4.0, 8.0, 14.0 g/m³.   There are 2 tables.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom
                gosuniversitete imeni V.V. Kuybysheva
                (Siberian Physico-technical Institute of the Tomsk
                State University imeni V. V. Kuybyshev)

SUBMITTED: September 8, 1961

Card 3/3

ZUYEV, V.Ye.

Integral functions of absorption of long-wave radiation in the
atmosphere. Part 2. Absorption by atmospheric CO_2. Izv. vys.
ucheb. zav.; fiz. no.6:109-112 '61.
(MIRA 15:1)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom
gosudarstvennom universitete imeni Kuybysheva.
. (Solar radiation)
(Carbon dioxide)

ZUYEV, V.Ye.

Overlapping integral of two absorption bands. Izv.vys.ucheb.zav.;
fiz. no.3:175-176 '61.   (MIRA 14:8)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom
universitete im. V.V.Kuybysheva.
                    (Absorption spectra)

ZUYEV, V. Ye.

Role of the temperature of the source in studying the integral absorption function for long-wave radiation in the surface layer of the atmosphere. Izv. vys. ucheb. zav.; fiz. no.6: 176-177 '62.   (MIRA 16:1)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosu-darstvennom universitete imeni Kuybysheva.

(Heat—Radiation and absorption)
(Atmosphere)

S/Φ15/62/003/000/010/033

Influence of source temperature on values
of ... and ... conditions of ... ...
... ... radiation in ... ... layer of
atmosphere

Akademiya nauk Kazakhskoy SSR. Astrofizicheskiy
institut. Trudy. v. ..., 1962, ...
... ...

The ... ... of absorpt... were
... ... by the formula

$$A = \sum A_i P$$

where A_i is the absorption function in the ... spectral interval,

Card 1, 3

S/911/62/003/000/010/033

Influence of source temperature ...

... and in the absorption function for the radiant-energy flux which ... in the absorbent layer in the ... interval ... The values of ... were ... and ... for source temperature ... submitted for distances ... and absolute moistures ranging from ... results of the calculations of the integral absorption functions of long-wavelength radiation at the bottom layer of the atmosphere were compared with experimentally determined integral absorption functions for source temperatures of ... respectively. There was good agreement between calculated and experimental values. It was found that the integral absorption functions depend ... on the source temperature in the temperature region ... on the other hand, for source temperatures ranging from ... the integral absorption functions are practically independent of the source temperature. The latter conclusion, which seems unexpected, is

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Influence of source temperature ..
the result of changes in the absorption bands. There are 2 tables.

Card 3/3

GALIBINA, L.I.; ZUYEV, V.Ye.

Absorption of long-wave radiation by bands of water vapor and CO_2 in the atmosphere in directions deviating from the vertical. Izv.vys.uch.zav.; fiz. no.4:69-74 '62.

(MIRA 15:9)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudatstvennom universitete imeni V.V. Kuybysheva.
(Atmosphere)   (Radiation)

ZUYEV, V.Ye.

Integral functions of the absorption of long-wave radiations in
the atmosphere. Part 3: Absorption by water vapor. Izv.vys,ucheb.
zav.;fiz. no.1:125-129 '62.
(MIRA 15:6)

1. Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom
universitete imeni V.V. Kuybysheva.
        (Radio waves)   (Atmosphere)

L0687

S/169/62/000/008/032/090
E202/E392

3.5158

AUTHORS: Antipov, B.A., Zuyev, V.Ye., Kokhanenko, P.N., Sonchik, V.K. and Fedyushin, A.A.

TITLE: Methods and certain results of studies of horizontal transparency of the atmosphere to long-wave radiation

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 8, 1962, 31, abstract 8B232. (In the symposium 'Aktinometriya i atmosfern. optika' (Actinometry and atmospheric optics), Leningrad, Gidrometeoizdat, 1961, 248 - 251)

TEXT: The effect of meteorological conditions on the transparency of the atmosphere to long-wave radiation (0.7 - 14 μ) over distances of 1.2, 3.5, 6.6 and 9.9 km was studied. Flat metallic radiators with electrical heating were used as sources of radiation. A vacuum thermo-element with a vibro-converter and a measuring amplifier 28AM (28IM) served as a receiver. The receiver was placed in the focus of a parabolic mirror. Simultaneously with the measurements at all four points the meteorological conditions were also measured, viz. temperature of

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Methods and certain results S/169/62/000/008/032/090
                                     E202/E392

the air, humidity, wind and intensity of precipitate. The
results of the measurements were presented in the form of
radiation curves vs. distance. The seasonal relation with
maximum attenuation which coincides with the period of highest
absolute humidity was found. A sharp attenuation of radiation
was observed up to 3.5 km during the winter period, then it
decreased, while during the summer period a sharp attenuation
was observed up to 6.5 km.
[Abstracter's note: Complete translation.]

Card 2/2

L 6938-66   EWT(1)/FCC   GS/GW

ACCESSION NR: AT5011176

UR/0000/64/000/000/0223/0228

AUTHOR: Zuyev, V. Ye.; Nesmelova, L. L.; Sapozhnikova, V. A.; Tvorogov, S. D.

TITLE: Calculations of atmospheric transparency for infrared radiation

SOURCE: Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery. Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 223-228

TOPIC TAGS: infrared radiation, atmospheric water vapor, atmospheric transparency, atmospheric light absorption, atmospheric optics

ABSTRACT: Precise computation of the absorption coefficient and the absorption function for the infrared absorption spectra of the principal absorbing components of the atmosphere is discussed. Such computations require knowledge of a large number of parameters characterizing both the molecule whose absorption spectrum is radiated and the transitions causing the presence of these lines and bands. Since much computation work is involved, simplification has been sought by using models of absorption bands. In this paper, the quasi-statistical model is used (V. R. Stull, P. J. Wyatt, G. N. Plass, Final report of the theoretical study of infrared radiative behavior of flames, 1961). In this approach, the

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L 6938-66

ACCESSION NR: AT5011176

statistical model is applied to a quite narrow spectral range so that, within this interval, any position of lines is equi-probable. The values for water vapor, carbon dioxide and ozone used in this paper were taken from the literature. Computations of absorption in the ozone band were made for heights of 10 and 21 km. The results are shown in Figures 1-4 of the Enclosure. Figures 1 and 2 show the spectrum of the water vapor and carbon dioxide bands (with overlapping taken into account) for pressures of 1 and 0.1 atm. Fig. 3 shows the absorption spectrum of water vapor for different pressures. Fig. 4 shows the absorption of carbon dioxide. Orig. art. has: 4 figures.

ASSOCIATION: Sibirskiy fiziko-tekhnicheskiy institut pri Tomskom gosudarstvennom universitete (Siberian Physics and Technology Institute at Tomsk State University)

SUBMITTED: 25Nov64   ENCL: 04   SUB CODE: ES

NO REF SOV: 001   OTHER: 004

Card   2/6

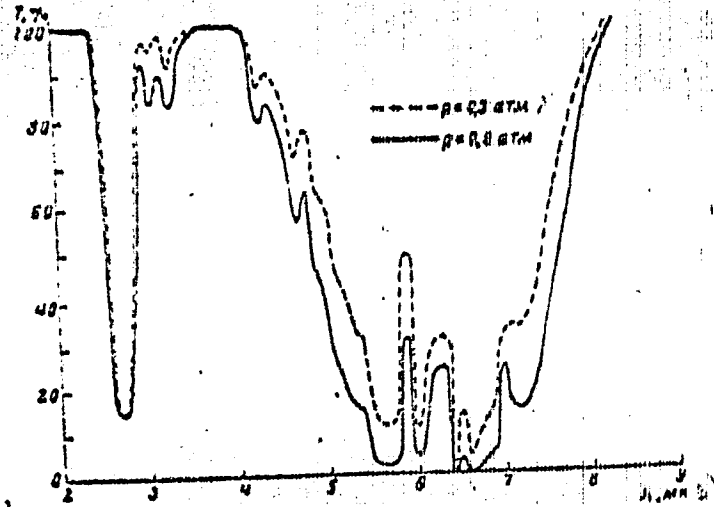L 6938-66

ACCESSION NR: AT5011176   ENCL: 01

Fig. 1. Spectral transmission of radiation in the range 2-8.5μ by water vapor bands for a precipitable layer of water μ = 0.3 mm for two pressures at heights of 10 and 1 km. A) atm; B) μ.

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L 6938-66

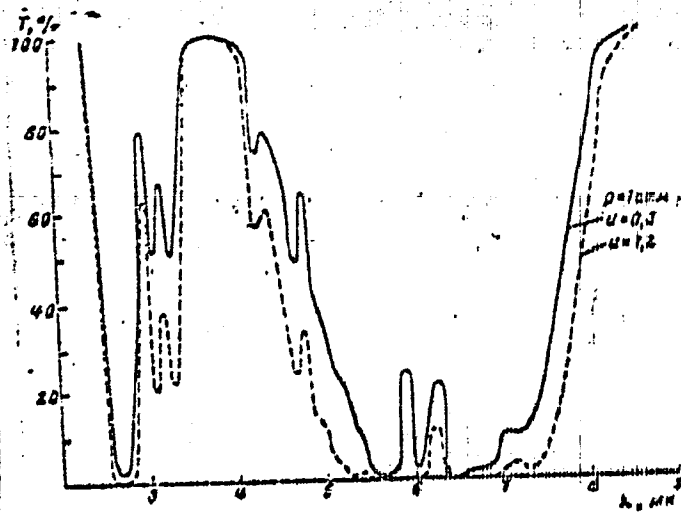ACCESSION NR: AT5011176   ENCL: 02

Fig. 2. Spectral transmission of radiation in the range 2-8.8μ by water vapor bands in the surface layer for two values of the precipitable layer of water; A) ntm; B) μ.
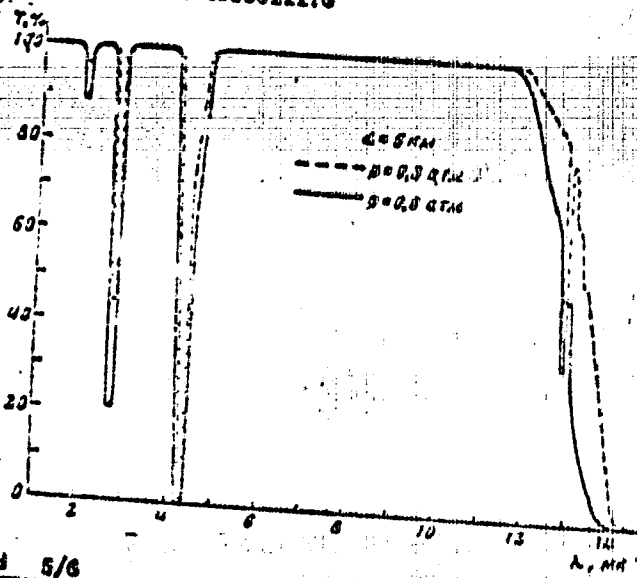
Card 4/6

L 6938-66

ACCESSION NR: AT5011176

ENCL: 03

Fig. 3. Spectral transmission of radiation in the range 1-15μ by carbon dioxide bands at a distance d = 5 km at heights of 10 and 1 km. A) aim; B) μ.
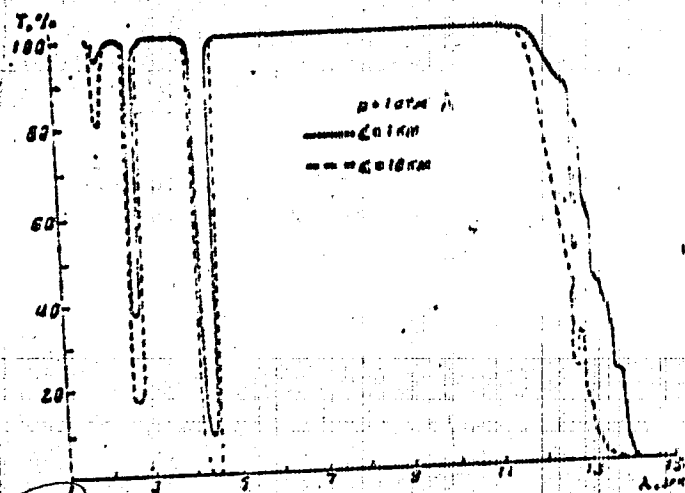
Card 5/6

L 6938-66

ACCESSION NR: AT6011176

ENCL: 04

Fig. 4. Spectral transmission of radiation in the range 1-15μ by carbon dioxide bands in the surface layer at a distance d = 1 and 10 km. A) atm, B) μ.

ZUYEV, '.' .; SHELEV, B.P.; TVOROGOV, S.D.; KIIMELEVTSOV, S.S.

Attenuation of the visible and infrared radiations by artificial water fogs. Izv. AN SSSR. Fiz. atm. i okeana 1 no.5:509-516 My '65.
(MIRA 18:8)

ZUYEV, V.Ye.; TVOROGOV, S.D.

Calculating the absorption function for nonuniform paths.
Izv. vys. ucheb. zav.; fiz. 8 no.6:84-86 '65.

(MIRA 19:1)

1. Sibirskiy fiziko-tekhnicheskiy institut imeni V.D.
Kuznetsova. Submitted July 15, 1964.

ZUYEV, V.Ye.; KABANOV, M.V.

Some characteristics of the attenuation of light in the
atmosphere. Izv. vys. ucheb. zav.; fiz. 8 no.6:175-177
'65.   (MIRA 19:1)

1. Sibirskiy fiziko-tekhnicheskiy institut imeni V.D.
Kuznetsova. Submitted July 15, 1964.

L 44211-66   ЕWT(1)/FCC   ТМ

ACC NR: AP5021189   SOURCE CODE: UR/0139/65/000/004/0185/0186

AUTHOR: Zuyev, V. Ye; Tvorogov, S. D.

ORG: Siberian Physico-Technical Institute imeni V. D. Kuznetsov (Sibirskiy fiziko-tekhnicheskiy institut)

TITLE: Scientific conference on spectral transparency of the atmosphere

SOURCE: IVUZ. Fizika, no.,4, 1965, 185-186

TOPIC TAGS: atmosphere, atmospheric optics, atmospheric radiation, atmospheric transparency, laser radiation, meteorologic conference, molecular spectroscopy

ABSTRACT: An Interinstitutional Scientific Conference on the Spectral Transparency of the Atmosphere in the Visible and Infrared Spectral Regions has been held in Tomsk from 29 June—1 July 1965. Participating in the conference were 127 representatives from 15 cities; 45 papers were presented and discussed. The authors of the papers dealt mainly with the basic processes determining the transparency of the atmosphere: molecular absorption, scattering of light by aerosol particles, and propagation of waves in a turbulent dedium. Some papers described new equipment. It was noted at the conference that modern methods of molecular spectroscopy are being used in the research work dealing with the theoretical and experimental analysis of molecular ansorption in the

Card   1/2