be solved by approximating these functions by the power functions

$$Q(t) = cqt^{\alpha}, \quad N(t) = Cnt^{\beta}, \quad c = \text{const}, \tag{1}$$

with the cross-section of the tube at a distance X from the orifice given by

$$F(x) = cx^{\nu - 1}, \tag{2}$$

provided

$$(1 + \alpha)(2 + \nu) - \nu(\beta + 3) = 0 \tag{3}$$

The latter condition ensures self-modelling of the problem provided the initial pressure in the tube p_o may be neglected. It is then shown that the problem may be reduced to the solution of a set of ordinary differential equations which have been considered by L. I. Sedov (Ref.1: Similarity and dimensional methods in mechanics, Gostekhizdat, Moscow, 1957). The solution exists provided

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Nonsteady motion of gas ... S/207/61/000/004/002/012
E032/E514

$$\frac{\beta + 3}{2 + \nu} \equiv \delta > \frac{2}{2 + \nu} . \qquad (8)$$

A detailed discussion is given of the conditions on the shock front and the numerical solution is reported for a conical tube and $\nu = 3$ for $\beta = 7$, $\gamma_1 = \gamma_2 = 5/3$, $\delta = 2$. There are 7 figures and 3 Soviet-bloc references.

SUBMITTED: June 7, 1961

Card 3/3

MARCHNKO, T.V.; DMITRIYEVA, G.B. [Dmyteiieva, H.B.]

Method for the determination of copper in biological material in forensic chemistry. Farmatsev. zhur. 16 no. 2:58-60 '61.
(MIRA 14:4)

1. Kafedra sudovoi khimii Kharkivs'kogo farmatsevtichnogo institutu.
(COPPER—ANALYSIS)

CHERNYAK, Yu.A.; MARCHENKO, V.A.

Improved circuit of an electromagnetic flowmeter. Avtom. i prib. no. 1:53-55 Ja-Mr '64. (MIRA 17:5)

MARCHENKO, V.A.

Effect of mineral fertilizers on the amino acids of potato proteins. Dokl. Akad. sel'khoz. 24 no.7:37-40 '57. (MIRA 12:10)

1. Institut kartofel'nogo khozyaystva. Predstavlena akademikom S.S. Perovym.

(Potatoes--Fertilizers and manures)
(Amino acids)

MARCHENKO, V.A.

Effect of water and sewage irrigation on the quality and yield of potatoes. Dokl.Akad.sel'khoz. 21 [i.e.23] no.12:40-43 '58. (MIRA 12:1)

1. Nauchno-issledovatel'skiy institut kartofel'nogo khozyaystva. Predstavleno akademikom I.A.Sharovym.
(Potatoes) (Irrigation farming) (Sewage irrigation)

MARCHENKO. V. A. Cand Agr Sci -- "Effect of various agricultural-engineering methods upon the yield, vitamin content, starchiness, and aminoacid composition of the potato-tuber protein." Kiev, 1960 (Min of Agr UkSSR. Ukrainian Acad of Agr Sci). (KL, 4-61, 205) [illegible], [illegible]; [illegible] Ye.Ya. (Khar'kov)

[illegible]oundary value problem[illegible] [illegible] no.3:458-472 [illegible] '64. ([illegible])

L 37735-66 EWT(d) IJP(c)

ACC NR: AP6015958 SOURCE CODE: UR/0039/66/069/001/0035/0060

AUTHORS: Marchenko, V. A. (Khar'kov); Suzikov, G. V. (Khar'kov) 29 B

ORG: none

TITLE: The second boundary value problem in domains with a complex boundary 16

SOURCE: Matematicheskiy sbornik, v. 69, no. 1, 1966, 35-60

TOPIC TAGS: boundary value problem, mixed boundary value problem, Green function, continuous function, mathematic space, harmonic function, existence theorem

ABSTRACT: Second boundary value problems in domains whose boundaries are closed surfaces with a large number of holes are examined. The behavior of the solutions of these problems when the number of holes increases without bound and their diameter approaches zero is studied. A Lyapunov space Γ with the Lyapunov index equal to unity in a three-dimensional space R_3 is considered:

$$D = R_3 \setminus \Sigma = D^+ \cup D^- \cup S,$$

$$S = \bigcup_{i=1}^{p} S_i; \quad \Sigma = \Gamma \setminus S.$$

In the domain D, the second boundary value problem for the Helmholtz equation is

$$\Delta u(P) + k^2 u(P) = \varphi(P); \quad \left.\frac{\partial u(P)}{\partial n}\right|_{\Sigma} = 0.$$

Card 1/3 UDC: 517.946.9

L 37735-66

ACC NR: AP6015958

Bounds of the Green functions $G_i(P, Q, i\lambda)$ and $G_e(P, Q, i\lambda)$ of the internal and external Neumann boundary value problem

$$\Delta u(P) - \lambda^2 u(P) = 0; \quad \left.\frac{\partial u(P)}{\partial n}\right|_\Gamma = \psi(P)$$

are introduced. The existence and properties of the Green function of the boundary problem are shown. The principal theorem is proved: When $n \to \infty$, 1) the diameters $d_i^{(n)}$ of the pieces $S_i^{(n)}$ removed from the surface Γ approach zero uniformly

$$\lim_{n\to\infty} \{\max_i d_i^{(n)}\} = 0;$$

2) the function

$$\delta(\rho) = \overline{\lim_{n\to\infty}} \left\{ \max_i \sum_{\substack{j \neq i \\ r_{ij}^{(n)} < \rho}} \frac{c_j^{(n)}}{r_{ij}^{(n)}} \right\}.$$

approaches zero when $\rho \to 0$; and 3) the capacities $c_i^{(n)}$ of the pieces $S_i^{(n)}$ satisfy the boundary relation

$$\lim_{n\to\infty} \sum_{(\sigma)} c_i^{(n)} = \int_{(\sigma)} f(P)\, dS_P$$

for any piece σ of surface Γ, where $f(P)$ is a continuous function on surface Γ. Then, when $n \to \infty$ in the domain $D^+ \cup D^-$ there exists a limit of the sequence of the Green functions $G^{(n)}(P, Q, k)$ ($\mathrm{Im}\, k > 0$) of the above boundary value problems

$$\lim_{n\to\infty} G^{(n)}(P, Q, k) = G(P, Q, k),$$

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and this limit of G(P, Q, k) is the Green function of the boundary value problem

$$\Delta u(P) + k^2 u(P) = \varphi(P) \quad (P \in D^+ \cup D^-)$$

with the following boundary conditions on surface Γ:

$$\left(\frac{\partial u(P)}{\partial n}\right)^+ = \left(\frac{\partial u(P)}{\partial n}\right)^-; \quad \left(\frac{\partial u(P)}{\partial n}\right)^+ = \pi f(P)[u^-(P) - u^+(P)].$$

The problem with mixed boundary conditions is examined, and the results are compared. Orig. art. has: 53 formulas, 2 diagrams, and 1 table.

SUB CODE: 12/ SUBM DATE: 15Mar65/ ORIG REF: 002

Card 3/3 vmb

MARCHENKO, V.A.

Among the Reports of the Academy of Sciences of the USSR. an article by MARCHENKO, V.A. "On certain functions." (Mathematics) is listed.

SO: Doklady Akademii Nauk SSSR, #9, Vol. LI, 1946, Unclassified.

Martchenko, V. A. Application de la méthode de sommation de Fejer-Bochner aux séries de Fourier généralisées. C. R. (Doklady) Acad. Sci. URSS (N.S.) 53, 7–9 (1946).

The author considers measurable complex functions $f(x)$ of the real variable x such that

$$\limsup_{T\to\infty} (2T)^{-1} \int_{-T}^{T} |f_n(x)|\, dx$$

is bounded in n, where $f_n(x) = f(x) \min [1, n|f(x)|^{-1}]$. Using the Lewitan mean

$$M\{f(t)\} = \lim_{n\to\infty} \left\{ \mathrm{Lim}_{T\to\infty} (2T)^{-1} \int_{-T}^{T} f_n(x)\, dx \right\}$$

(in which Lim denotes the Banach limit), the author defines the Fourier coefficients $a(\lambda) = M\{f(t) \exp(-i\lambda t)\}$ and states that $a(\lambda)$ is nonvanishing for only a countable set of λ, so that each of his functions has a generalized Fourier series $f(x) \sim a(0) + \sum a(\lambda_k) \exp i\lambda_k x$. He now defines a topology on the real axis in terms of which "continuous" and "uniformly continuous" functions are necessarily Lewitan almost periodic and Bohr almost periodic functions, respectively, and functions for which $a(\lambda) \equiv 0$ vanish at every point of "continuity." Other theorems concerning the approximation of the author's functions and summability of his Fourier series are stated. In particular, if $f(x)$ is bounded, its Fourier series is summable to $f(x)$ by the Bochner-Fejér method at each point of "continuity" of $f(x)$.

R. H. Cameron.

Source: Mathematical Reviews, Vol 8 No. 10

MARCHENKO, V.

Marčenko, V. The momentless spherical shell for large displacements. Doklady Akad. Nauk SSSR (N.S.) 57, 21–24 (1947). (Russian)

The author considers a closed spherical shell subjected to a uniform internal pressure and compressed between two parallel planes. Equations of momentless shell theory are used and the displacements are supposed to be large. Using Gauss-Codazzi relations, Hooke's law and the equilibrium equations, the author obtains a system of equations describing the state of stress in an arbitrary axially symmetric shell.

I. S. Sokolnikoff (Los Angeles, Calif.)

Source: Mathematical Reviews, 1948, Vol. 9, No. 5

MARCHENKO, V.A.

Ahiezer, N. I.; and Marčenko, V. A. On some questions of approximations of continuous functions on the whole real axis. II. Har'kov. Gos. Univ. Uč. Zap. 29=Zap. Mat. Otd. Fiz.-Mat. Fak. i Har'kov. Mat. Obšč. (4) 21(1949), 5-9. (Russian)

[For part I see Zap. Naučno-Issled. Inst. Mat. Meh. Har'kov. Mat. Obšč. (4) 19 (1948), 21-25; MR 12, 89.] The authors use Poisson's summation formula to construct approximating trigonometric polynomials for entire functions of exponential type σ for which $f(x)|x-i|^{-2r-1} \in L^2(-\infty, \infty)$. The trigonometric polynomials (generalizations of Levitan's polynomials) are expressible in the form

$$S_h^{(r)}(x)=\sum_{k=-\infty}^{\infty} f(x+2k\pi/h)\left(\frac{2\sin\frac{1}{2}hx}{hx+2k\pi}\right)^{2r+2}, \quad h=\sigma/n.$$

The authors obtain the following estimate: if $|f(x)|\leq A+Bx^{2r}$ then

$$|f(x)-S_h^{(r)}(x)|\leq(A+Bx^{2r})(r+2)\left\{1-\left(\frac{2\sin\frac{1}{2}hx}{hx}\right)^2\right\}.$$

They also show how to express $S_h^{(r)}(x)$ in terms only of $f(0), f'(0), \cdots, f^{(2r+1)}(0)$ and $f(k\pi/\sigma)$.
R. P. Boas, Jr.

MARCHENKO, V.A.

SOV MATHEMATICAL REVIEW (unclassified)
VOL XIV, NO 3, pp233-240 March 1953

Marčenko, V. A. Methods of summation of generalized Fourier series. Učenye Zapiski Har'kov. Gos. Univ. 28, Zapiski Naučno-Issled. Inst. Mat. Meh. i Har'kov Mat. Obšč. (4) 20, 3–32 (1950). (Russian)

A set E of real numbers is called a relatively dense interval set, when there exist two positive numbers l and δ such that every interval of length l contains an interval of length δ belonging to E. The additive group of real numbers is organized as a topological group Ω with all symmetric relatively dense interval sets as neighbourhoods of zero. The class of functions continuous on Ω is identical with the class of Levitan-almost periodic (L.a.p.) functions, while the class of functions uniformly continuous on Ω is the class of ordinary almost periodic functions. By means of Banach limits the author introduces a mean value for every bounded function and extends the definition to certain unbounded functions. Every measurable function $f(x)$ which has a mean value has a Fourier series, and the author proves that this Fourier series is summable with sum $f(x)$ in every continuity point (in the sense of Ω). Fejér-Bochner summation can be applied if $f(x)$ is bounded, but de la Vallée Poussin summation can be applied, even if $f(x)$ is not bounded. Let $E(\alpha)$, $0<\alpha<\infty$, be a system of neighbourhoods of zero decreasing continuously to the empty set when $\alpha\to 0$ and satisfying the condition $E(\alpha)+E(\beta)\subset E(\alpha+\lambda(\beta))$ where $\lambda(\beta)\to 0$ when $\beta\to 0$. A point, where the limit

$$\limsup_{\alpha\to 0} M_{E(\alpha)}\{|f(x)-f(x+t)|\}$$

can be arbitrarily small by convenient choice of the system $E(\alpha)$, is called a Lebesgue point of $f(x)$. The author proves that the Fourier series determines $f(x)$ uniquely at every Lebesgue point.

In a supplement to this paper the author repeats in a slightly generalized form a direct proof by N. Bogoljubov [Krylov and Bogoljubov, New methods of nonlinear mechanics . . . (Russian), Moscow-Leningrad, 1934, p. 62] of the approximation theorem for ordinary almost periodic functions. The arithmetic properties of the translation numbers, which are essential for the discussion of L.a.p. functions, are derived from this theorem. *H. Tornehave.*

SOV MATHEMATICAL REVIEW (unclassified)
Vol XIV, No 3, pp233-240 March 1953

MARCHENKO, V. A.

Marčenko, V. A. On functions which are normal relative to a symmetric displacement operation. Učenye Zapiski Har'kov. Gos. Univ. 28, Zapiski Naučno-Issled. Inst. Mat. Meh. i Har'kov. Mat. Obšč. (4) 20, 33–42 (1950). (Russian)

Let $f(x)$ be a continuous, complex-valued function of a real variable x, $-\infty < x < \infty$. The operation

$$L_s f(x) = \tfrac{1}{2}(f(x+s) - f(x-s))$$

is called a generalized translation, and $f(x)$ is called normal with respect to generalized translations if every sequence of functions $L_{s_\nu} f(x)$, $\nu = 1, 2, \cdots$, has a uniformly convergent subsequence. The author proves that the class of functions normal in this sense, is the class of functions $ax + \varphi(x)$ where a is constant while $\varphi(x)$ is an ordinary almost periodic function. *H. Tornehave* (Lyngby).

SOURCE: MATHEMATICAL REVIEW (unclassified) Vol XIV, No 3, pp233-240 March 1953

MARCHENKO, V.A.

Marčenko, V. A. On some questions of the approximation of continuous functions on the whole real axis. III. Har'kov. Gos. Univ. Uč. Zap. 34=Zap. Mat. Otd. Fiz.-Mat. Fak. i Har'kov. Mat. Obšč. (4) 22 (1950), 115-125 (1951). (Russian)

Let $\alpha(x)$ be positive, continuous, even, increasing to ∞ for $x\to+\infty$, and greater than 1, and let it satisfy the conditions $\alpha(x+y)\leq\alpha(x)\alpha(y)$ and $\int_{-\infty}^{\infty}(1+x^2)^{-1}\log\alpha(x)dx<\infty$. [The first of these is more restrictive than one might suppose: cf. Cooper, Proc. London Math. Soc. (2) 26 (1927), 415-432.] The author constructs a kernel $K(x)$ such that, for each positive λ, $|K(\lambda x)|<M_\lambda(1+x^2)^{-1}/\alpha(x)$, $\int_{-\infty}^{\infty}K(x)dx=1$ and the Fourier transform of K vanishes for $|x|\geq1$, so that K is a generalized Fejér kernel of as arbitrary rate of decrease as it is possible to achieve. Except for a normalizing factor,

$$K(x)=\prod_{k=1}^{\infty}\left(\frac{\sin\frac{1}{2}a_kx}{\frac{1}{2}a_kx}\right)^2,$$

where $a_k=C_k\beta(k)S^{-1}k^{-2}$, $\beta(x)=\log\alpha(x)$, C_k are chosen so that $C_k>1$, $C_k\to\infty$, and $\sum k^{-2}\beta(k)C_k=S<\infty$. Two applications are given. The first is to a generalization of Levitan's trigonometric polynomials of approximation to an entire function of exponential type: here the entire function F of type a satisfies $\sup|F(x)/\alpha(x)|<\infty$ and the trigonometric polynomials $S_h(x)\to F(x)$ uniformly on

Marčenko, V. A.

compact sets as $h \to 0$; their exponents $\lambda_k(h)$ are such that $\max_k |\lambda_k(h)| \leq \sigma + h$; and $\sup_x |S_h(x)/\alpha(x)| \leq \sup |F(x)/\alpha(x)|$. The second application is to a summation method for the "cardinal" interpolation series based on the values $F(n\pi/\sigma)$. *R. P. Boas, Jr.* (Evanston, Ill.). 2/2

MARCHENKO, V. A. FA 175T39

USSR/Mathematics - Operators 21 May 50
Eigenfunctions

"Certain Problems in the Theory of the Second-Order Differential Operator," V. A. Marchenko, Sci Res Inst Math and Mech, Khar'kov State U

"Dok Ak Nauk SSSR" Vol LXXII, No 3, pp 457-460

Considers $L(u) = u''(x) - q(x) \cdot u(x)$ and auxiliary eq $L(u) + \lambda u = 0$. Several theorems on the operator L are proved. Submitted 29 Mar 50 by Acad S. N. Bernshteyn.

[redacted] 175T39

Marčenko, V. A. Transformation of operators. Doklady Akad. Nauk SSSR (N.S.) 74, 185–188 (1950). (Russian)

The solution of $L[u]+\lambda u=0$, $L[u]=u''-q(\lambda)u$, with $u(\lambda, 0)=1$, $u'(\lambda, 0)=h$ is denoted by $w_h(\lambda, x)$. The case $h=\infty$ represents $u(\lambda, 0)=0$, $u'(\lambda, 0)=1$. If L_1 and L_2 are two operators, one with $q_1(x)$ and the other $q_2(x)$, then $w_h^{(2)}(\lambda, x)$ associated with L_2 is given by a linear operation V in $w_h^{(1)}(\lambda, x)$ where $V(f)=f(x)+\int_0^x K(x, t)f(t)dt$. This notion is developed by the author for the case $\int_0^\infty (1+x^2)q(x)dx<\infty$. Reference is made to results of Povzner [Mat. Sbornik N.S. 23(65), 3–52 (1948)=Amer. Math. Soc. Translation no. 5 (1950); these Rev. 10, 299; 11, 360] and Agranovič [Doklady Akad. Nauk SSSR (N.S.) 66, 1025–1028 (1949); these Rev. 11, 28].

N. Levinson (Cambridge, Mass.).

Source: Mathematical Reviews, Vol. 12, No. 7

MARCHENKO, V.A.

Marčenko, V. A. On the transformation formulas generated by a linear differential operator of the second order. Doklady Akad. Nauk SSSR (N.S.) 74, 657–660 (1950). (Russian)

In the notation of an earlier paper [same Doklady 74, 185–188 (1950); these Rev. 12, 502], the author considers the Weyl expansion theorem

$$E(\lambda)=\int_{-\infty}^{\infty} f(x)\omega(\lambda,x)dx, \quad f(x)=\int_{-\infty}^{\infty} E(\lambda)\omega(\lambda,x)d\rho(\lambda)$$

where $f(x)\epsilon L^2(0,\infty)$. Lemmas concerning the growth of $\rho(\lambda)$ are given extending earlier results of Levitan [ibid. 71, 605–608 (1950); these Rev. 11, 720]. Formulas relating $\rho(\lambda)$ and $c(\lambda)=\int_0^\infty f(x)\cos\lambda x\,dx$ are obtained as are other related results. *N. Levinson* (Cambridge, Mass.).

Source: Mathematical Reviews, Vol 12 No. 9.

MARCHENKO V. A. FA 172T36

USSR/Mathematics - Operational Calculus 11 Oct 50
Almost Periodicity

"Generalized Almost-Periodic Functions," V. A. Marchenko, Sci Res Inst of Math and Mech, Khar'kov State U

"Dok Ak Nauk SSSR" Vol LXXIV, No 5, pp 893-897

Extension of Delsartes work with differential operator of 2d order of form $L(u) = u''(t) - q(t)u(t)$ assocd with operator of generalized displacement. Submitted by Acad S. N. Bernshteyn 29 Jun 50.

[redacted] 172T36

MARCHENKO, V. A.

Differential Equations

Some problems of the theory of one-dimensional linear differential operators of the second order; part 1. Trudy Mosk. mat. bo., No. 1, 1952

Monthly List of Russian Accessions, Library of Congres, November 1952. UNCLASSIFIED

MARCHENKO, V.A.

1-FW

Math

Marčenko, V. A. On finite perturbations of one-dimensional differential operators of second order. Har'kov. Gos. Univ. Uč. Zap. 40=Zap. Mat. Otd. Fiz.-Mat. Fak. i Har'kov. Mat. Obšč. (4) 23 (1952), 73–77 (1954). (Russian)

Let q be a real-valued function defined on $0 \leq x < a$ $(a \leq \infty)$, and let L denote the formal differential operator $Lu = u'' - qu$ on $0 \leq x < a$. If $\hat{q}$ vanishes in a neighborhood ... is called a finite per-

MARCHENKO, V. A.

The Committee on Stalin Prizes of the Council of Ministers USSR in the field of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kul'tura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Marchenko, V. A.	"Certain Problems of the Theory of One-Dimensional Linear Differential Operators of the Second Order" (Parts I and II)	Mathematical Institute imeni V. A. Steklov, Academy of Sciences USSR; Khar'kov University imeni A. M. Gor'kiy

MARCHENKO, V. A.

MARCENKOV, V.A.

Some Questuons of the Theory of the Homo enous Linear Differential Operatios of the Second Order. I. II. Trudy Moskovsk. Mat. Obsc. 1, 327-420 (1953).

MARCHENKO, V.A.

Certain problems in the theory of univariate linear differential operators of the second order. Trudy Mosk.mat. ob-va 2:3-83 '53.
(MLRA 7:11)

(Operators (Mathematics)) (Differential equations)

MARCHENKO, V. A.

259T68

USSR/Mathematics - Eigenfunction Expansions 1 May 53

"Expansion in the Eigenfunctions of the Equation y"+[L-q(x)]y=0," B. M. Levitan

DAN SSSR, Vol 90, No 1, pp 17-20

A study of the spectral function θ(x,y,L) of y"+[L-q(x)]=0 given in the interval (-oo,oo), where q(x) is assumed to be real and summable in each finite interval and the solutions f(x,L), p(x,L) satisfy usual initial conditions (B. M. Levitan, Razlozheniye po Sobstvennym Funktsiyam,

259T68

Expansion in Eigenfunctions, Moscow-Leningrad, 1950). Cites related work of V. A. Marchenko, Trudy Moskovskogo Matematicheskogo Obshchestva, 1, 327 (1952). Presented by Acad S. N. Bernshteyn 3 Mar 53.

MARCHENKO, V. A.

USSR/Mathematics - Hypercomplex

"Hypercomplex Systems Constructed in Accordance with the Sturm-Liouville Equation on the Semiaxis," Yu. M. Berezanskiy, Inst of Math, Acad Sci Ukr SSR

DAN SSSR, Vol 91, No 6, pp 1245-1248 1953

Studies rings of summable functions constructed from the Sturm-Liouville eq $y'' = q(t)y - \lambda y$ $(0 \leq t \leq \infty)$ without any limitations on the order of smallness of $q(t)$ at infinity, but under the assumption that this function is of bounded variation on the semiaxis $(0,\infty)$. This problem was first studied by A. Ya Povzner (Mat Sbor. 23 (65), No 1, 1948) for $q(t) = O(t^{-a-\epsilon})$ $(a\ 2,3; \epsilon > 0)$ and V. A. Marchenko in his doctoral dissertation (Trudy Moskov Mat Ob-va, Vol 2, No 3, 1953). Cites N. Levinson, Duke Math J. 15, No 1, 1948. Presented by Acad A. N. Kolmogorov 27 June 53.

275T73

MARCHENKO, V.A.

SUBJECT USSR/MATHEMATICS/Functional analysis CARD 1/2 PG -191
AUTHOR MARČENKO V.A.
TITLE Theorems of the Tauberian type in the spectral analysis of the differential operators.
PERIODICAL Izvestija Akad. Nauk 19, 381-422 (1955) reviewed 8/1956

Let L be the differential operator $-(d/dx)^2 + q(x)$ where q is real and integrable on every closed subinterval of a fixed interval I given by $0 \leq x < a$. Let $w(\lambda,x)$, (λ real), be the solution of $Lw = \lambda w$ satisfying $w = 1$, $w' = \theta$ at the origin, (θ real). It is well known that there exists at least one non-decreasing function ρ, a spectral function, such that $(Tf)(\lambda) = \lim \int_0^b f(x)w(\lambda,x)dx$, $(b \to a)$, is a unitary mapping from the space of square integrable functions on I to the space H_ρ of functions defined on the entire axis and square integrable with respect to ρ. This mapping has the inverse $(T^{-1}F)(x) = \lim \int_{-N}^{+N} F(\lambda)w(\lambda,x)d\rho(\lambda)$, $(N \to \infty)$. In particular, when $a = \infty$ and $\theta = 0$, there is a unique spectral function $\rho_0 = 0$ when $\lambda \leq 0$, $\rho_0 = 2\pi^{-1}\sqrt{\lambda}$ otherwise, corresponding to the cosine transform T_0 for which $w = w_0 = \cos \sqrt{\lambda}x$. It is shown that $\overline{\lim} |\rho(\lambda) - (\rho_0(\lambda) - \theta)| \leq 5.10^7/a$, where ρ is normalized so that $2\rho(\lambda) = \rho(\lambda + 0) + \rho(\lambda - 0)$, $\rho(-\infty) = 0$ and that

$\lim \left| \int^{N} Tf(\lambda) w(\lambda, x)\, d\rho(\lambda) - \int^{N} T_0 f(\lambda) w_0(\lambda, x)\, d\rho_0(\lambda) \right| = 0$, $(N \to \infty)$ uniformly on compact subsets of I when f is square integrable on I (and continued by 0 outside I when $T_0 f$ is computed). By means of a transformation $f(x) \Rightarrow f(x) + \int K(x,y) f(y)\, dy$, of the well known triangular type, the proofs are reduced to the following Tauberian situation. Let $(Sf)(\lambda) = \int e^{-i\lambda x} f(x)\, dx$ denote the Fourier transform and assume that we have an identity of the following form

$$(1) \qquad \int Sf(\lambda)\, d\tau(\lambda) = \int f^{(n)}(x)\, G(x)\, dx$$

where f is a function in C^{∞} vanishing outside an interval J containing the origin and τ is the difference between two non-decreasing functions ρ and ρ_0 one of which, e.g. ρ_0 satisfies the condition $\overline{\lim}\, (\rho_0(\lambda + \lambda_0) - \rho_0(\lambda)) |\lambda|^{-n} < \infty$, $(|\lambda| \to \infty)$, for some $\lambda_0 > 0$. Knowing the properties of G at the origin, it is required to estimate the difference τ for large $|\lambda|$, or, more generally, estimate the expression $\int T_N(\lambda)\, d\tau(\lambda)$ for large N, where, roughly speaking, T_N approaches 1 as $N \to \infty$. To do this, the author puts in (1) $f = \varphi S^{-1} T_B$, where $\varphi \in C^{\infty}$ vanishes outside J and equals 1 in a neighborhood of the origin. Then $\int T_N(\lambda)\, d\tau(\lambda) = \int (SS^{-1} - S\varphi S^{-1}) T_N(\lambda)\, d\tau(\lambda) + \int f^{(n)}(x) G(x)\, dx$. A Tauberian theorem is obtained by estimating the right side under suitable assumptions. The estimates are precise but too complicated to be given here.

MARCHENKO, V.A.

SUBJECT USSR/MATHEMATICS/Functional analysis CARD 1/2 PG - 187
AUTHOR MARČENKO V.A.
TITLE Establishment of the potential energy in terms of phases of the dispersed waves.
PERIODICAL Doklady Akad. Nauk 104, 695-698 (1955)
reviewed 8/1956

Consider the differential operator $Su = -u'' + V(x)u$, ($x \geq 0$, V real) with the boundary condition $u(0) = 0$. Let $u(\lambda,x)$ and $u(\lambda_k,x) \in L^2$, $k = 1,2,\ldots$, be solutions of $Su = \lambda^2 u$ and $Su = -\lambda_k^2 u$ respectively normalized so that $\delta(x-y) = \int_0^\infty u(\lambda,x)u(\lambda,y)d\lambda + \sum u(\lambda_k,x)u(\lambda_k,y)$. Then for large x, $u(\lambda,x)$ behaves like $\varphi(\lambda,x) = \sqrt{2/\pi}\sin(\lambda x + \eta(\lambda))$, ($\eta$ is the asymptotic phase) and $u(\lambda_k,x)$ like $\varphi(\lambda_k,x) = m_k e^{-\lambda_k x}$. The converse spectral problem consists in finding V in terms of the functions φ and was solved by e.g. Gel'fand and Levitan (Izvestija Akad. Nauk, Ser.mat. 15, 309 (1951). A variant of their solution is obtained as follows. Put

$$f(x) = \sum m_k^2 e^{-\lambda_k x} - (2\ \ )^{-1}\int_{-\infty}^{+\infty}(e^{2i\eta(\lambda)}-1)e^{i\lambda x}d\lambda,$$

Doklady Akad. Nauk 104, 695-698 (1955) CARD 2/2 PG - 187

solve the integral equation $f(x+y) + A(x,y) + \int_x^\infty f(y+t)A(x,t)dt = 0, \ (x < y)$, for A and compute $u(\lambda,x) = \varphi(\lambda,x) + \int_x^\infty A(x,t)\varphi(\lambda,t)dt$. The solution presupposes $\int x|V(x)|\, dx < \infty$.

INOZEMTSEV, O.I.; MARCHENKO, V.A.

Majorants of the zero kind. Usp. mat. nauk 11 no.2:173-178
Mr-Ap '56. (MLRA 9:8)
(Functions, Analytic)

МАРЧЕНКО, В.А.

DRINFEL'D, G.I.; MARCHENKO, V.A.; POVZNER, A.Ya.

Concerning certain works on analysis and algebra published by the Kharkov University. Uch.zap.KHGU 65:59-64 '56. (MIRA 10:7)
(Kharkov--Mathematics--Study and teaching)

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/2 PG - 737
AUTHOR AGRANOVIČ Z.S., MARČENKO V.A.
TITLE Determination of the potential energy with respect to the dispersion matrix.
PERIODICAL Uspechi mat.Nauk 12, 1, 143-145 (1957) reviewed 5/1957

Let the system of differential equations

$$(1) \qquad y''_\alpha + \lambda^2 y_\alpha = \sum_{\beta=1}^{n} v_{\alpha\beta}(x) y_\beta \qquad (0 \le x < \infty;\ \alpha = 1,2,\dots,n)$$

with the real symmetric matrix $v(x) = \| v_{\alpha\beta}(x) \|$, $\int_0^\infty x|v(x)|dx < \infty$ possess the solution matrix $G(x,\lambda)$ which is composed by those solutions for which $y_\alpha(0) = 0$ $(\alpha = 1,2,\dots,n)$. For real λ and $x \to \infty$ by the expression $e^{i\lambda x}E - e^{-i\lambda x}S(\lambda)$ the asymptotic behavior of $G(x,\lambda)$ is described, where $S(\lambda)$ is the so-called dispersion matrix.
The authors develop a method for the determination of $v(x)$ for given $S(\lambda)$, given $\mu_k = (i\lambda_k)^2$ and given matrices M_k. These latter describe the asymptotic behavior of those matrices which are formed by eigenvectors which

Uspechi mat.Nauk 12, 1, 143-145 (1957) CARD 2/2 PG - 737

correspond to the eigenvalue μ_k. It is shown that an operator $Kf = f(x) + \int_x^\infty K(x,t)f(t)dt$ is existing which transforms every solution $z(x,\lambda)$, being bounded for $x \to \infty$, of the system $z''_\alpha + \lambda^2 z_\alpha = 0$ $(\alpha = 1,\dots,n)$ into a solution $y(x,\lambda)$ of (1), where $\lim_{x\to\infty} [y(x,\lambda) - z(x,\lambda)] = 0$. Here $K(x,x) = \frac{1}{2}\int_x^\infty v(t)dt$. It is proved that $K(x,y)$ satisfies the linear integral equation

$$F(x+y) + K(x,y) + \int_x^\infty K(x,t)F(t+y)dt = 0, \tag{2}$$

where $F(u) = \sum_k M_k M_k^* e^{-\lambda_k u} + \frac{1}{2\pi}\int_{-\infty}^{+\infty} [E - S(\lambda)]\, e^{i\lambda u}\, d\lambda$.

This equation has a single solution and with the aid of the formula for $K(x,x)$ then $v(x)$ can be determined.

MARCHENKO, V.A.

20-5-1/67

AUTHOR AGRANOVICH Z.S., MARCHENKO V.A.

TITLE The Setting Up of the Potential of the Scattering Matrix For a System of Differential Equations.
(Vosstanovleniye potentsiala po matritse rasseyaniya dlya sistemy differentsial'nykh uravneniy -Russian)

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 5, pp 951-954 (U.S.S.R.)
Received 6/1957 Reviewed 7/1957

ABSTRACT The present paper deals with the inverse problem of the scattering theory for a system of differential equations of the form $y''_\alpha + \lambda^2 y_\alpha = \sum_{\beta+1}^{n} v_{\alpha\beta}(x) y_\beta$, $0 < x < \infty$ ($\alpha = 1, 2, \ldots n$) (A). The authors here give a direct solution of the problem by making use of a method developed by V.A.MARCHENKO, Dokl.Akad.Nauk.Vol 104, Nr 5, p 695(1955). The system A is equivalent to the matrix equation $Y'' + \lambda^2 Y = V(x)Y$. The potential matrix $V(x) = \| v_{\alpha\beta}(x) \|_1^n$ is hermetic and is assumed to satisfy the condition $\int_0^\infty t|V(t)|\,dt < \infty$. From this condition there follows the integral $\sigma(x) = \int_0^\infty |V(t)|\,dt$ for any $x > 0$. The following theorem applies: the equation $Y'' + \lambda^2 Y = V(x)Y$ has a solution $E(x, \lambda) = e^{-i\lambda x} I + \int_x^\infty K(x,t) e^{-i\lambda t}\,dt$ at any λ on the semiplane $\operatorname{Im}\lambda \leqslant 0$. Here I denotes the unit matrix, and the matrix $K(x,t)$ satisfies the inequation $|k(x, t)| \leqslant C\sigma((x+t)/2)$ (C=const). Here $2K(x,x) = \int_x^\infty V(t)\,dt$, $0 < x < \infty$ applies.

Card 1/2

The Setting Up of the Potential of the Scattering Matrix For A System of Differential Equations. 20-5-1/67

The second chapter of this paper deals with the system determined by the system (A) and the condition $y_\alpha(0,\lambda)=0, \alpha=1,2...n$.
The third chapter deals with the inverse problem. Here the HERMITE matrices M_k, the numbers $\mu_k > 0 (k = 1,2,...p)$ and the unitary matrix I_s are assumed. From these data a matrix $f(u)$ and further an equation with the unknown matrix $K(x,y)$ is constructed. The corresponding theorems are written down.
(No ill.).

ASSOCIATION State University KHAR'KOV
PRESENTED BY BERNSTEIN S.N., Member of the Academy
SUBMITTED 28.10.1956
AVAILABLE Library of Congress
Card 2/2

MARCHENKO, V. A.

"The Inverse Problem of Scattering Theory,"

paper submitted at International Congress Mathematicians, Edinburgh, 14 - 21 Aug 1958.

AUTHOR: Agranovich, Z.A., Marchenko, V.A. 20-118-6-1/43

TITLE: The Construction of the Tensor Forces by the Data of Dispersion (Vosstanovleniye tenzornykh sil po dannym rasseyaniya)

PERIODICAL: Doklady Akademii Nauk, 1958, Vol 118, Nr 6, pp 1055-1058 (USSR)

ABSTRACT: Given the equation

(1) $$Y'' - \left[V(x) + 6x^{-2}P\right]Y + \lambda^2 Y = 0 \qquad (0 < x < \infty),$$

where $P = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$ and $V(x) = \| v_{jk}(x) \|_1^2$ denotes a quadratic Hermitean matrix of second order which for a certain $\varepsilon > 0$ satisfies the condition

(A) $$\int_0^\infty t^{1+\theta} |V(t)| \, dt < \infty \qquad (-\varepsilon < \theta < \varepsilon).$$

Let the boundary condition be

(2) $$Y(0) = 0.$$

Theorem: The boundary value problem (1)-(2) has a continuous spectrum for $\lambda^2 > 0$ and possibly a finite number of non-positive

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eigenvalues $0 \geqslant \lambda_1^2 > \lambda_2^2 > \dots > \lambda_p^2$. If λ^2 belongs to the spectrum, then there exist solutions $U(x, \lambda)$ of (1) which vanish in $x = 0$ and which generate an equation of Parceval being equivalent to the following decomposition of the δ-function:

$$(3) \qquad \delta(x-y) \cdot I = \sum_{k=1}^{p} U(x, \lambda_k) U^*(y, \lambda_k) + \frac{1}{2\pi} \int_0^\infty U(x,\lambda) U^*(y,\lambda) d\lambda .$$

I is the unit matrix, U^* is the matrix conjugate Hermitean to U. The matrices $U(x, \lambda)$ of (3) can be normed such that for $x \rightarrow \infty$ there holds

$$U(x, \lambda) \sim e^{i\lambda x} I - e^{i\lambda x} S(-\lambda) \qquad (\lambda^2 > 0)$$

$$U(x, \lambda_k) \sim e^{-|\lambda_k| x} \cdot M_k \qquad (\lambda_k^2 < 0)$$

The dispersion matrix $S(\lambda)$, the eigenvalues and the matrices

Card 2/3

M_k are denoted as data of dispersion. We have

20-118-6-1/43

The Construction of the Tensor Forces by the Data of Dispersion

$$F_1(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \left[I - S(\lambda)\right] e^{i\lambda t} \, d\lambda,$$ where the elements of the

Hermitean matrix $F_1(t)$, $-\infty < t < \infty$ can be represented as sums of two functions, one of which is summable and the other is summable in the square and bounded; for all $t > 0$ there exists $F_1'(t)$ and we have $\int_0^{\infty} t^{1+\theta} \left| F_1'(t) \right| dt < \infty \quad (-\varepsilon < \theta < \varepsilon)$. Besides

$S(0)P = P$.

In a further theorem the authors give four necessary and sufficient conditions that a given unitary matrix $S(\lambda)$, the numbers $\lambda_k^2 \leq 0$ and the Hermitean matrices M_k are the data of dispersion of a boundary value problem (1)-(2) with the Hermitean potential $V(x)$ which satisfies (A).

There are 3 references, 1 of which is Soviet, 1 American, 1 English.

PRESENTED: October 9, 1957, by S.N.Bernshteyn, Academician
SUBMITTED: October 9, 1957

Card 3/3

AUTHOR: ~~Marchenko, V.A.,~~ Rofe-Beketov, F.S. 20-120-5-9/67

TITLE: Expansion in Terms of Eigenfunctions of Non-Selfadjoint Singular Differential Operators (Razlozheniye po sobstvennym funktsiyam nesamosopryazhennykh singulyarnykh differentsial'nykh operatorov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 120, Nr 5, pp 963-966 (USSR)

ABSTRACT: The authors consider an arbitrary non-selfadjoint boundary value problem

$$(1) \qquad l[y] \equiv y'' - q(x)y = -\lambda^2 y \qquad (0 \leq x < \infty)$$

$$y'(0) - Ay(0) = 0$$

and analogous problems for finite and infinite systems of differential equations. Here $q(x)$ is an arbitrary function summable on every finite interval and A is an arbitrary complex number. The authors extend the notion of the spectral function $\varrho(\lambda)$ proved by H.Weyl [Ref 1] for the selfadjoint case: Now $\varrho(\lambda)$ is a generalized function in a topological space Z. At the same time the expansion formulas of Weyl [Ref 1] are generalized too. The authors give conditions that a generalized function is the spectral function of the problem (1). The generalized functions used by the authors correspond best to the scheme of Gel'fand and Shilov

Card 1/2

Expansion in Terms of Eigenfunctions of Non-Selfadjoint Singular Differential Operators 20-120-5-9/67

[Ref 2]. Altogether five theorems are announced which essentially represent an extension of results well-known in the selfadjoint case [Ref 4,5] to the non-selfadjoint case.
There are 7 references, 5 of which are Soviet, 1 German and 1 Swedish.

ASSOCIATION: Khar'kovskiy gosudarstvennyy universitet imeni A.M.Gor'kogo (Khar'kov State University imeni A.M.Gor'kiy)
PRESENTED: February 3, 1958, by S.N.Bernshteyn, Academician
SUBMITTED: February 2, 1958

1. Mathematics 2. Operators (Mathematics)

Card 2/2

MARCHENKO, V.A.

PHASE I BOOK EXPLOITATION SOV/5164

Agranovich, Zalman Samoylovich, and Vladimir Aleksandrovich Marchenko

Obratnaya zadacha teorii rasseyaniya (Inverse Problem of the Scatter Theory) Khar'kov, Izd-vo Khar'kovskogo univ., 1960. 267 p. 4,000 copies printed.

Resp. Ed.: N.S. Landkof, Docent; Ed.: A.N. Tret'yakova; Tech. Ed.: A.S. Trofimenko.

PURPOSE: This book is intended for scientists working in the field of mathematics and theoretical physics; it may also be useful to advanced students interested in the spectral theory of differential equations.

COVERAGE: The book deals with one of the new problems in the spectral theory of differential equations - the so-called inverse problem of the quantum theory of scatter. This problem, which has its origin in theoretical physics, is, in the simplest case, reduced to the formation of the differential operator, based on the asymptotic behavior of its normed eigenfunctions at infinity. The book contains a rigorous investigation and solution of the above-mentioned problem. The mathematical apparatus developed for this may also find application in other related problems. Conventionally, problems that indicate which spectral data

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unequivocally determine the differential operator, and present methods for reducing the operator according to these data, have been called "inverse spectral-analysis" problems. The following personalities are mentioned: V.A. Ambartsumyan, V.A. Marchenko, M.G. Kreyn, I.M. Gel'fand, and B.M. Levitan. There are 14 references: 10 Soviet and 4 English.

TABLE OF CONTENTS:

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S/039/60/052/002/004/004
C111/C222

16.4600 16.3400

AUTHOR: Marchenko, V.A. (Khar'kov)

TITLE: Expansion in Terms of Eigenfunctions of Non-Selfadjoint Singular Second Order Differential Operators 16

PERIODICAL: Matematicheskiy sbornik, 1960, Vol.52, No.2, pp.739-788

TEXT: Let W^2 be the set of all even entire functions of exponential type which on the real axis are summable in the square. Let Z be a linear topological space consisting of all even entire functions of exponential type being summable on the real axis, where the addition and multiplication with complex numbers are defined in the usual manner, while the convergence is defined as follows: $F_n(\lambda) \in Z$ converges to $F(\lambda)$ if $\lim\limits_{n\to\infty} \int\limits_{-\infty}^{\infty} |F(\lambda)-F_n(\lambda)|\,d\lambda = 0$ and the degrees σ_n of the functions $F_n(\lambda)$ are bounded: $\max \sigma_n < \infty$. The set of functions $\phi(\lambda) = \sum\limits_{i=1}^{m} b_i F_i(\lambda) G_i(\lambda)$, where F_i, $G_i \in W^2$, b_i-complex numbers, is a linear subset everywhere dense in Z. On this set the functional R is

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APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R001032220014-6"

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defined by $R[\phi(\lambda)] = \int_{-\infty}^{\infty} \phi(\sqrt{\mu}) d\varrho(\mu)$, where $\sqrt{\mu} = \lambda$. This continuous functional is extended on Z and is interpreted as a generalized function over Z: $R[\phi(\lambda)] = (R, \phi(\lambda))$.
Then a well-known result of H. Weyl (Ref. 1) can be formulated: I' To every selfadjoint boundary value problem

(A) $$l[y] = \frac{d^2}{dx^2} y(x) - q(x)y(x)$$

(B) $$y'(0) - hy(0) = 0$$

there corresponds a certain generalized function R defined over Z so that

(8) $$\int_0^{\infty} f(x)g(x)dx = (R, E_f(\lambda)E_g(\lambda)),$$

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where f(x) and g(x) are arbitrary finite functions of $L^2[0,\infty)$. If the ω-Fourier transformation $E_f(\lambda)$ of the finite function f(x) belongs to Z, then $f(x) = (R, E_f(\lambda)\,\omega(\lambda,x))^f$.

Here $\omega(\lambda,x)$ is the solution of $l[y]+\lambda^2 y = 0$ with the initial values

(1) $\omega(\lambda,0) = 1, \quad \omega'(\lambda,0) = h.$

The author shows that the assertion I' can be extended to arbitrary non-selfadjoint boundary value problems (A)-(B). With the aid of the method of I.M. Gel'fand and B.M. Levitan (Ref.3) the author finds conditions which must be satisfied by a generalized function over Z in order that it is a spectral function of a problem (A)-(B). The analytic form of the spectral function can be determined in exceptional cases.

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Expansion in Terms of Eigenfunctions of Non-Selfadjoint Singular Second Order Differential Operators

A part of the results are already published in (Ref.5).
The author mentions S.N. Bernshteyn, G.Ye. Shilov, M.G. Kreyn, I.M. Glazman, B.V. Lidskiy and M.A. Naymark.
There are 13 references: 10 Soviet, 1 American, 1 German, and 1 Swedish.

SUBMITTED: March 6, 1959

X

Card 4/4

MARCHENKO, V. A.

"The generalized spectral function"

report submitted at the Intl Conf of Mathematics, Stockholm. Sweden, 15-22 Aug 62

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R001032220014-6"

37055
S/057/62/032/004/001/017
B125/B108

9.3700

AUTHORS: Agranovich, Z. S., Marchenko, V. A., and Shestopalov, V. P.

TITLE: Diffraction of electromagnetic waves on plane metal gratings

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 4, 1962, 381-394

TEXT: The authors have calculated the diffraction of a plane polarized electromagnetic wave incident perpendicularly upon a periodic grating parallel to the x-axis in the XOY plane (E_y, E_z, H_y, H_z = 0). l is the grating constant, d is the gap width. The metal is a perfect conductor. The two special cases of E polarization ($\vec{E}_0 \parallel OX$) and H polarization ($\vec{H}_0 \parallel OX$) can be calculated similarly. The sought electrical field is

$$E_x = e^{-ikz} + \sum_{n=-\infty}^{\infty} a_n e^{i\sqrt{k^2-\left(\frac{2\pi n}{l}\right)^2}\,z}\, e^{\frac{2\pi i n}{l}y} \quad (z>0), \qquad (3)$$

above the grating (superposition of the incident and reflected fields) and

$$E_x = \sum_{n=-\infty}^{\infty} b_n e^{-i\sqrt{k^2-\left(\frac{2\pi n}{l}\right)^2}\,z}\, e^{\frac{2\pi i n}{l}y} \quad (z<0), \qquad (3')$$

below it. The equations

$$\sum_{n=-\infty}^{\infty} b_n e^{in\varphi} = 0, \quad \frac{\pi d}{l} < |\varphi| < \pi, \qquad (7)$$

$$\sum_{n=-\infty}^{\infty} b_n |n| (1 - \varepsilon_n) e^{in\varphi} = i\varkappa (b_0 - 1), \quad |\varphi| < \frac{\pi d}{l}. \qquad (7'),$$

with the assumption $\varepsilon_n \to 0$ for $|n| \to \infty$, with $b_0 = 1 + a_0$; $b_n = a_n$ $(n \neq 0)$ and $\sum_{n=-\infty}^{\infty} b_n e^{(2\pi i n/l)y} = 0$ (on the metal), give with the substitution

$$V_n(\zeta_0) = \frac{1}{\pi i} \int_{L_1} \frac{\zeta^n}{\zeta - \zeta_0} \sqrt{(\zeta - a)(\zeta - \bar{a})}\, d\zeta \quad (\zeta_0 \in L_1),$$

$$V_m^n = \frac{1}{2\pi} \int_{-\pi}^{\pi} V_n(e^{i\varphi}) R(e^{i\varphi}) e^{-im\varphi} d\varphi,$$

$$R_m = \frac{1}{2\pi} \int_{-\pi}^{\pi} R(e^{i\varphi}) e^{-im\varphi} d\varphi; \quad R_{[0]} = \sum_{m \neq 0} (-1)^m \frac{R_m}{m}; \qquad (17),$$

the infinite set of equations

$$\left.\begin{aligned} x_m &= i\varkappa b_0 V_m^0 - i\varkappa V_m^0 + \sum_{n\neq 0} x_n \frac{|n|}{n} \varepsilon_n V_m^n + 2cR_m \quad (m\neq 0),\\ 0 &= i\varkappa b_0 V_0^0 - i\varkappa V_0^0 + \sum_{n\neq 0} x_n \frac{|n|}{n} \varepsilon_n V_0^n + 2cR_0,\\ -b_0 &= i\varkappa b_0 V_{[\sigma]}^0 - i\varkappa V_{[\sigma]}^0 + \sum_{n\neq 0} x_n \frac{|n|}{n} \varepsilon_n V_{[\sigma]}^n + 2cR_{[\sigma]}, \end{aligned}\right\} \quad (19)$$

$$x_n = b_n n.$$

for determining b_0, x_m, and b_m, where $x_n = b_n n$. (19) can be solved numerically e.g. by successive approximation if ε is sufficiently small. The authors consider the case in which $0 < \varkappa < 3$ (so that $\varepsilon_{\pm 1}$, $\varepsilon_{\pm 2}$, $\varepsilon_{\pm 3}$ are of the order of unity). In this case, the longwave approximation does not hold any longer, the shortwave one does not yet. (19) gives with $\varepsilon_n = 0$ at every $|n| > N$ a finite set of equations:

$$b_0 = \frac{i\varkappa\Delta}{i\varkappa\Delta + D}; \quad b_n = \frac{x_n}{n} = -\frac{1}{n}\frac{i\varkappa D^{(n)}}{i\varkappa\Delta + D}, \qquad (21)$$ with

$$\left.\begin{aligned} \Delta &= \Delta_0 + \sum_i \Delta_i \varepsilon_i + \sum_{i<j} \Delta_{ij}\varepsilon_i\varepsilon_j + \sum_{i<j<k} \Delta_{ijk}\varepsilon_i\varepsilon_j\varepsilon_k + \dots, \\ D &= D_0 + \sum_i D_i\varepsilon_i + \sum_{i<j} D_{ij}\varepsilon_i\varepsilon_j + \sum_{i<j<k} D_{ijk}\varepsilon_i\varepsilon_j\varepsilon_k + \dots, \\ D^{(n)} &= D_0^{(n)} + \sum_i D_i^{(n)}\varepsilon_i + \sum_{i<j} D_{ij}^{(n)}\varepsilon_i\varepsilon_j + \sum_{i<j<k} D_{ijk}^{(n)}\varepsilon_i\varepsilon_j\varepsilon_k + \dots, \end{aligned}\right\} \qquad (23).$$

Every ε_i may be a co-factor of first or zeroth degree. D and $D^{(n)}$ are the algebraic complements of the elements $V^o_{[\sigma]}$ and $\varepsilon_n\left[V^n_{[\sigma]} + V^{-n}_{[\sigma]}\right]$ in the determinant Δ. Formula (21) is the exact solution of the problem if Δ, D, and $D^{(n)}$ are replaced by infinite series following from (23) for $N \to \infty$. The $R_{[\sigma]}$ and $V^n_{[\sigma]}$ can be expressed by Legendre polynomials. A. Yu. Titarenko is thanked for calculations and drawings. There are 5 figures and 5 references: 2 Soviet and 3 non-Soviet. The reference to the English-

S/057/62/032/004/001/017
B125/B108

Diffraction of electromagnetic ...

language publication reads as follows: G. L. Baldwin, A. E. Heins, Math. scand., 2, no. 1, 103, 1954.

ASSOCIATION: Fiziko-tekhnicheskiy institut nizkikh temperatur AN USSR (Physicotechnical Institute of Low Temperatures AS UkrSSR) Khar'kovskiy gosudarstvennyy universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy)

SUBMITTED: April 14, 1961

Card 5/5

CHERNYAK, Yu.A.; MARCHENKO, V.A.; KORSUNSKIY, L.M., kand.tekhn.nauk

Electromagnetic flowmeter with a standard secondary instrument. Avtom.i prib. no.1:56-59 Ja-Mr '63. (MIRA 16:3)

1. Ukrainskiy gosudarstvennyy proyektnyy institut "Tyazhpromavtomatika" (for Chernyak, Marchenko). 2. Khar'kovskiy gosudarstvennyy institut mer i izmeritel'nykh priborov (for Korsunskiy).

(Flowmeters)

L 15008-65 EWT(d) Pg-4 IJP(c)/AFWL/ASD(a)-5/AFETR/ESD(dp)
ACCESSION NR: AP4049382 S/0039/64/065/003/0458/0472

AUTHORS: Marchenko, V. A.; Khruslov, Ye. Ya.

TITLE: Boundary value problems with fine grained boundary

SOURCE: Matematicheskiy sbornik, v. 65, no. 3, 1964, 458-472

TOPIC TAGS: boundary value problem, Green function, differential equation, integral operator

ABSTRACT: The authors seek the Green's function G

$$\Delta G + k^2 G = \delta(P, Q) \quad (\operatorname{Im} k > 0) \qquad (1)$$

for the Helmholtz equation in the region in R^3 bounded by some fixed surface Γ. They consider a sequence of regions $D^{(n)}$ with boundaries $\{S(F_i^{(n)})\}$, where $F_i^{(n)}$ is a body bounded by closed Lyapunov surfaces $S(F_i^{(n)})$, and their corresponding Green's functions $G^{(n)}(P,Q;k)$. As $n \to \infty$ they find conditions for existence of

$$\lim_{n\to\infty} G^{(n)}(P, Q; k) = G(P, Q; k), \qquad (2)$$

seek a limiting function, solving the Helmholtz equation (1) under certain boundary conditions on the surface Γ, and determine these boundary conditions. They

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generalize to show strong convergence to an integral operator with kernel G(P,Q;k) satisfying

$$\Delta G - 4\pi f(P) G + k^2 G = \delta(P, Q). \qquad (3)$$

"The authors express their unbounded gratitude to N. S. Landkof for his valuable discussions." Orig. art. has: 29 formulas and 3 figures.

ASSOCIATION: none

SUBMITTED: 19Mar64 ENCL: 00

SUB CODE: MA NO REF SOV: 002 OTHER: 000

Card 2/2

MITROPOL'SKIY, Yu.A., otv. red.; BEREZANSKIY, Yu.M., red.; BREUS, K.A., red.; ZMOROVICH, V.A., red.; LYASHKO, I.I., red.; MARCHENKO, V.A., red.; PARASYUK, O.S., red.; POLOZHIY, G.N., red.; FIL'CHAKOV, P.F., red.; KULAKOVSKAYA, N.S., red.

[Mathematical physics] Matematicheskaia fizika. Kiev, Naukova dumka, 1965. 156 p. (MIRA 18:8)

1. Akademiya nauk URSR, Kiev.

ACC NR: AR7000894 SOURCE CODE: UR/0058/66/000/009/H035/H035

AUTHOR: Marchenko, V. A.; Sologub, V. G.

TITLE: Excitation of a circular waveguide by a dipole

SOURCE: Ref. zh. Fizika, Abs. 9Zh253

REF SOURCE: Radiotekhnika. Resp. mezhved. nauchno-tekhn. sb., vyp. 1, 1965, 3-13

TOPIC TAGS: circular waveguide, dipole moment, dipole, magnetic dipole, dipole excitation

ABSTRACT: A study has been made on the excitation of a circular waveguide by electric and magnetic dipoles with individual moments aligned with the waveguide axis. The dipole field in the presence of the waveguide is determined proceeding from expressions for this field in a free space field by using the Hertz vectoring device. The latter is broken into two components, the first one representing an undisturbed field and the other one showing the perturbations caused by the presence of periodic systems emanating from the infinitely thin ideally-conductive

ACC NR: AR7000894

rings. Both components are expressed in Fourier integrals as Henkel's functions of the first type, zero order. The periodic function describing the perturbation of the field is expanded into the Fourier series by using Bessel and Henkel's functions inside and outside the waveguide, respectively. When applying boundary conditions and using the relationship between Bessel's and Henkel's functions, two infinite systems of linear algebraic equations result with regard to the coefficient of expansion. An approximate solution of the system obtained may be found by the successive-approximation method. The solution to the first approximation is obtained under the condition that $kl/\pi<1$, where k is the propagation constant in free space, and l is the structural period. The limiting terms for the field vectors have been defined with $l\to 0$ from which the decrease in field amplitude with $|z|\to\infty$ is investigated, where z is the longitudinal axis of the waveguide. The results obtained here agree with those of earlier research (TZhFiz, 1959, No. 2, 3932). [Translation of abstract]. [KP]

SUB CODE: 20/

Card 2/2

AKHIYEZER, N.I.; MARCHENKO, V.A.

Boris Moiseevich Levitan, 1914- ; on his 50th birthday. Usp. mat. nauk 20 no.3:227-234 My-Je '65. (MIRA 18:6)

MARCHENKO, V.A.

Age factor in the pathogenesis of coronary insufficiency. Trudy LPMI 31 no.2:421-427 '63. (MIRA 17:10)

1. Iz kafedry gospital'noy terapii Leningradskogo pediatricheskogo meditsinskogo instituta.

MARCHENKO, Vladislav Borisovich; ZHIGAREV, A.A., red.; VORONIN, K.P., tekhn. red.

[Modern cathodes] Sovremennye katody. Moskva, Gos. energ. izd-vo, 1958. 29 p. (Massovaia radiobiblioteka, no.305). (MIRA 11:10)
(Cathodes)

SOV/109-3-8-4/18

AUTHORS: Kul'varskaya, B.S., Marchenko, V.B. and Stepanov, G.V.

TITLE: Emission Characteristics of the Oxides of Rare-earth Metals (Emissionnyye svoystva okislov redkozemel'nykh metallov)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol 3, Nr 8, pp 1005 - 1009 (USSR)

ABSTRACT: The paper gives some experimental data on thermionic and secondary electron emission of various rare-earth oxides. The investigations were carried out on thin layers of rare-earth oxides having a thickness of about several thousand Å. The layers were obtained in a special device by evaporating the oxide from a tungsten vessel. The following characteristics were measured: the dependence of the secondary electron emission coefficient σ on the velocity of the primary electrons U_p, collector potential U_c and the incidence angle of the primary electrons φ. The results are shown in Figures 1 and 2 and in Table 1. Figure 1 shows $\sigma = f(U_p)$ for: 1) holmium oxide; 2) samarium oxide; 3) gadolinium oxide and 4) lutecium oxide. Figure 2

Card1/3

SOV/109-3-8-4/18

Emission Characteristics of the Oxides of Rare-earth Metals

represents $\sigma = f(U_p)$ for ytterbium oxide for various angles of incidence. The table shows the maximum secondary emission coefficient; this is found to vary from 1.7 to 2.83. The thermal emission characteristics of the oxides were studied on the basis of the Richardson curves. The measurements were carried out in a special, experimental diode, fitted with a directly heated tungsten cathode. The anode system consisted of three coaxial cylinders, the middle cylinder being the actual anode. The Richardson emission constants A and the work function φ were determined for the oxides of the following metals: Yt, La, Pr, Ne, Sm, Eu, Gd, Tb, Dy, Ho, Er, Yb, Lu and Th. These are shown in Table 2 (p 1007). Some of the Richardson curves are given in Figure 3. From the investigation, it is concluded that a number of rare-earth oxides, in particular, those of yttrium can be used successfully as emissive material in the cathodes where thorium oxides have been employed.

Card2/3

SOV/109-3-8-4/18

Emission Characteristics of the Oxides of Rare-earth Metals

The authors express their gratitude to Professor B.M. Tsarev for his constant interest in this work and for the discussion of the results and also to Yu.F. Sokolov for his help.
There are 3 figures, 2 tables and 8 references, 5 of which are Soviet and 3 English.

SUBMITTED: August 15, 1957

Card 3/3

1. Rare earth metal oxides--Properties 2. Secondary emission analysis 3. Thermionic emission 4. Thin films--Preparation

AKHMANOV, S.A.; YESHTOKIN, V.N.; MARCHENKO, V.F.

Methodology for measuring frequency fluctuation spectra of microwave generators. Radiotekh. i elektron. 7 no.12:2024-2032 D '62. (MIRA 15:11)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta im. M.V. Lomonosova.
(Microwave tubes) (Microwave measurements)

S/141/63/006/001/013/018
E192/E382

AUTHORS: Gvozdover, S.D., Gorshkov, A.S. and Marchenko, V.F.

TITLE: Investigation of travelling-wave amplifiers based on semiconductor diodes

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 6, no. 1, 1963, 126 - 136

TEXT: The amplifiers are based on a coaxial or symmetrical strip line with a TEM-wave. The lines are provided with parametric diodes which either shunt the line or are connected into the center conductor (see Fig. 1, where $Z_s = jZ_o \sin(\beta\ell_o)$, $Y_p = j(2/Z_o)tg(\beta\ell_o/2)$ and ℓ_o is the length of a section of the line; for the series-connected diodes $Z_s = -2jZ_o tg(\beta\ell_o/2)$, $Y_p = j\frac{1}{Z_o}\sin(\beta\ell_o)$, where Z is the wave impedance of the line; Fig. 1B represents the equivalent circuit of a parametric diode). The parameters of the amplifier are chosen in such a way that $\omega_H = \omega_c + \omega_p$, where ω_H is the pump frequency, ω_c the signal

Card 1/5

frequency and ω_p the difference frequency; also, the phase synchronism should be maintained:

$$B_c + B_p = B_H \qquad (1)$$

where B_c, B_H and B_p are the phase shifts per dioded segment for the signal, pump and difference frequencies, respectively. The gain factor of the amplifier with parallel diodes is given by:

$$\alpha = \frac{m\, y(\omega_c) y(\omega_p)}{2Z_o\, C_\Delta} \sqrt{\frac{\sin(\beta_p \ell_o)\sin(\beta_c \ell_o)}{\omega_c \omega_p \sin B_p \sin B_c}} \qquad (2a)$$

and for the series diodes it is:

$$\alpha = \frac{m}{2Z_o C_\Delta} \sqrt{\frac{\sin(\beta_o \ell_o)\sin(\beta_\omega \ell_o)}{\omega_c \omega_p \sin B_p \sin B_c}} \quad (3a)$$

where $m = \xi V_{H0}$ is the capacitance-modulation coefficient, $\beta\ell_o$ is the wave-shift in the line segment without diodes, $y(\omega) = Z_o \omega C_\Delta [1 - (\omega/\omega_\Delta)^2]^{-1}$, $\omega_\Delta = 1/\sqrt{L_\Delta C_\Delta}$ is the resonance frequency of the diode and C_Π is the capacitance of a diode-holder. By taking into account the losses in the line which are assumed to be entirely due to the resistance R_s of the diodes, it is found that the gain of the amplifier is:

$$G_p = e^{-2\alpha_\Pi N} ch^2(\alpha N) \quad (4a)$$

where N is the number of the diodes and α_Π is the attenuation coefficient of a segment of a cold line. Two experimental amplifiers were constructed. The system with parallel diodes was built in such a way that the signal and pump frequency waves propagated along two symmetrical strip lines having the same external plates. The amplifier consisted of 10 sections in which the diodes had a capacitance of 0.27 - 0.3 pF, the equivalent inductance was 1.5×10^{-9} H and R_s = 5 - 7 ohm. With optimum value biasing voltages of the diodes, an operating bandwidth of 12% was obtained and the maximum gain was 13 db. The calculated value of gain by using Eq. (2a) was 12 db. The amplifier with series-connected diodes also consisted of two symmetrical strip lines and the decoupling between the signal and pump lines was about 12 db. A bandwidth of about 10% and gain of 7 db were obtained with this amplifier. The noise factor was about 4 to 5 db. The formulas for calculating the gain are reasonably accurate, in particular, for amplifiers operating over the frequency range in the vicinity of the resonance frequency of the diodes. However, the experiments and theory seem to diverge at cm waves, which can be explained by the presence of additional losses caused by the contact of the diodes with the conductors of the line.

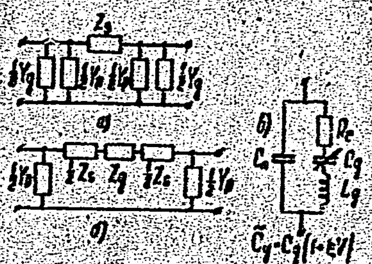
Investigation of S/141/63/006/001/013/018
E192/E382

There are 6 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: May 15, 1962

Fig. 1:



Card 5/5

L 24744-65 EWA(k)/EWT(1)/EEC(k)-2/T/EEC(b)-2/EWP(k)/EWA(m)-2 Pf-4/Pi-4/Pl-4/
Po-4 IJP(c)/SSD/AFWL/ASD(a)-5/AFETR/ESD(gs)/ESD(t) JHB/WG/RB
ACCESSION NR: AP5001543 S/0188/64/000/006/0003/0010

AUTHOR: Marchenko, V. F.

46
43
B

TITLE: A special case of wave interaction at the boundary of a nonlinear medium

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fizika, astronomiya, no. 6, 1964, 3-10

TOPIC TAGS: nonlinear dielectric, reflected wave, refracted wave, light amplification, parametric light amplification

ABSTRACT: Numerous authors (e.g., J. Armstrong et al., Phys. Rev., 127, 1918, 1962) have studied the amplification and generation of light waves in infinite nonlinear dielectrics, within the framework of the phenomenological theory. Although N. Bloembergen and P. Pershan (Phys. Rev., 128, 606, 1962) developed equations for the reflected and refracted waves of the second harmonic (of the combination frequency) near a boundary of a specified nonlinear dielectric, their solutions are not correct for the resonant case. Using the method of contracted equations (S. A. Akhmanov, R. V. Khokhlov, ZhETF, 43, 351, 1962), the present author has solved a special case with plane waves of arbitrary initial amplitudes and three frequencies incident on a boundary between the linear and weakly nonlinear transparent dispersive medium. The derivation of the basic relationships

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ACCESSION NR: AP5001543

3

yielding the amplitudes of the reflected and refracted waves is followed by a discussion of phase relationships on the boundary of the nonlinear medium. Waves exhibiting multiple reflections at the boundaries of the nonlinear dielectric can be parametrically amplified; however, the practical realization of this amplification principle would require modulation coefficients ($p \leq 10^{-5}$) not yet achieved. "The author is indebted to S. A. Akhmanov and R. V. Khokhlov for their interest in the work." Orig. art. has: 20 formulas and 3 figures.

ASSOCIATION: Kafedra radiotekhniki Moskovskogo universiteta (Department of Radio Technology, Moscow State University)

SUBMITTED: 04Nov63 ENCL: 00 SUB CODE: EC, OP

NO REF SOV: 004 OTHER: 004 ATD PRESS: 3167

Card 2/2

BR

ACCESSION NR: AP4038641 S/0109/64/009/005/0822/0829

AUTHOR: Marchenko, V. F.; Trofimenko, I. T.

TITLE: Experimental investigation of a subharmonic oscillator

SOURCE: Radiotekhnika i elektronika, v. 9, no. 5, 1964, 822-829

TOPIC TAGS: oscillator, subharmonic oscillator, computer, digital computer

ABSTRACT: A fundamental shortcoming of the 1850-mc semiconductor-diode subharmonic oscillator (I. Abeyta, et al., Proc. IRE, 1961, 49, 1, 128) is that it uses two parametric diodes, which makes tuning complicated and impairs reliability. The present article suggests filters for the input-output channel separation. The oscillator includes a subharmonic circuit, an input pumping channel that rejects the subharmonic frequency, and an output subharmonic channel with a filter rejecting the pumping signal. A 2500—3000-mc oscillator

ACCESSION NR: AP4038641

microstrip design is shown in Fig. 1 of the Enclosure. Formulas and methods of calculating the oscillator components are given. These experimental curves are submitted: resonant frequency vs. diode bias voltage; output subharmonic power vs. input pumping power for various degrees of oscillator-load coupling; threshold pumping power vs. pumping frequency for two oscillator resonant frequencies. The phase locking-in of the oscillator by a weak external signal was also investigated. "The authors wish to thank S. A. Akhmanov for his constant attention to the work, and M. A. Kashintsev for his help in carrying out the measurements." Orig. art. has: 7 figures and 2 formulas.

ASSOCIATION: Fizicheskiy fakultet Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova (Physics Faculty, Moscow State University)

SUBMITTED: 19Mar63 ATD PRESS: 3073 ENCL: 01

SUB CODE: EC NO REF SOV: 002 OTHER: 003

Card 2/3

ACCESSION NR: AP4038641

ENCLOSURE: 01

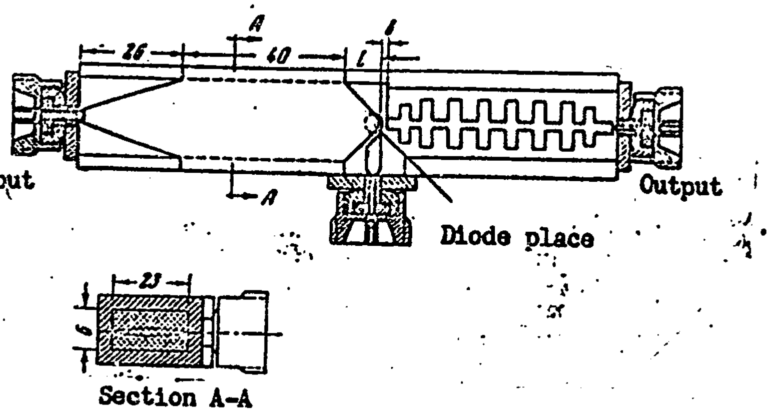

Fig. 1. Parametric subharmonic SHF oscillator designed with microstrips

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L 55999-65 EWT(1)/EWT(m)/EPF(c)/EWP(1)/EEC(t)/EWP(t)/EWP(b) Pi-4 IJP(c)
JD/WW/GG
ACCESSION NR: AP5016630 UR/0188/65/000/003/0084/0088
535.44

AUTHOR: Gol'din, Yu. A.; Marchenko, V. F.

TITLE: Generation of the second harmonic of light in a thin crystal layer

SOURCE: Moscow. Universitet. Vestnik. Seriya 3, Fizika, astronomiya, no. 3, 1965, 84-88

TOPIC TAGS: nonlinear optics, harmonic generation, second harmonic, nonlinear effect, frequency converter

ABSTRACT: The authors suggest a system for generating the second harmonic from the fundamental which consists of a thin layer of nonlinear dielectric embedded in another dielectric medium. The fundamental undergoes a series of complete internal reflections in the layer, and the harmonics generated with each reflection are superimposed. The conditions under which the fundamental will undergo complete internal reflection, while the harmonics fall on the boundary at Brewster's angle, are stated for the three axial orientations of the optical axis of a uniaxial crystal layer. The intensity of the harmonic thus developed is found by the summation

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L 55939-65

ACCESSION NR: AP5016630

method used in the theory of multibeam interferometers. Semiconductors which might be used in such a system are suggested, and the possibility of employing CdS embedded in $CaCO_3$ to fulfill the requisite conditions is considered in detail. The described system can be used as a low-power frequency converter. Orig. art. has: 2 figures and 6 formulas. [YK]

ASSOCIATON: Kafedra radiotekhniki Moskovskogo gosudarstvennogo universiteta (Department of Radio Technology, Moscow State University)

SUBMITTED: 30Aug64 ENCL: 00 SUB CODE: OP, SS

NO REF SOV: 002 OTHER: 005 ATD PRESS: 4034

Card 2/2

L 55018-65 EWT(1)/EWP(m)/EPF(c)/EPR/EEC(t)/FCS(k)/EWA(1) Pd-1/Pi-4 IJP(c)
ACCESSION NR: AP5014513 WW/GG UR/0141/65/008/002/0405/0407

AUTHOR: Marchenko, V. F.

33
31
B

TITLE: Energy relations at the boundary of a nonlinear medium

SOURCE: IVUZ. Radiofizika, v. 8, no. 2, 1965, 405-407

TOPIC TAGS: light reflection, light refraction, nonlinear medium, boundary layer, nonlinear optics, harmonic generation, tourmaline, nonlinear dielectric

ABSTRACT: A calculation method is described which makes it possible to determine the energy relations between the incident, reflected, and refracted waves at the interface between a linear and nonlinear dielectric. The derivation is based on the conservation of the time-averaged energy flux through the surface, and is presented in the form of a zero-order approximation and higher-order corrections. The harmonics generated by the nonlinearity of the medium are estimated. The method makes it possible to estimate the power contained in any harmonic arising on the boundary of the nonlinear dielectric, if the characteristics of the crystal and the magnitude of the incident radiation are known, provided the boundary layer is

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L 55018-65

ACCESSION NR: AP5014513

sufficiently thin. For simplicity, the analysis is limited to the case of a semi-infinite crystal such as tourmaline, the optical axis of which is parallel to the interface. "The author is grateful to R. V. Khokhlov for interest in the work." [02]
Orig. art. has: 15 formulas.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: 30Mar64 ENCL: 00 SUB CODE: OP, SS

NO REF SOV: 002 OTHER: 001 ATD PRESS: 4027

Card 2/2

ACC. NR: AP7000030 SOURCE CODE: UR/0051/66/021/005/0592/0602

AUTHOR: Marchenko, V. F.

ORG: none

TITLE: A multibeam study of the generation of the second optical harmonic in a nonlinear crystal layer

SOURCE: Optika i spektroskopiya, v. 21, no. 5, 1966, 592-602

TOPIC TAGS: nonlinear optics, second harmonic, harmonic generation, nonlinear crystal

ABSTRACT: Generation of the second optical harmonic was used as a model in an investigation of nonlinear phemomena occurring in a nonlinear layer during propagation of an intense, infinite plane wave. The assumption was made that the layer represents a nonlinear "quadratic" medium. The problem was solved using a method of multiple reflections of the fundamental wave—a method based on the summation of multiply reflected and refracted waves at the layer's boundary—and by assuming that the generation of harmonics is a stationary process with respect to time and space. Expressions were found for the intensity of the second harmonic outside the layer. The results were generalized for the case of bounded optical beams, and can be used to study the generation processes in a nonlinear layer with a lateral input where the

 UDC: 621.375.9:535.0

ACC NR: AP7000030

input beam diffraction is predominant. This type of system makes it possible to obtain compounding effects in crystals in which the mode-locking criterion cannot be fulfilled. Orig. art. has: 2 figures and 20 formulas.

SUB CODE: 20/ SUBM DATE: 20Mar65/ ORIG REF: 009/ OTH REF: 001/ ATD PRESS: 5108

Card 2/2

ACC NR: AP6026936 SOURCE CODE: UR/0141/66/009/004/0757/0764

AUTHOR: Gorshkov, A. S.; Marchenko, V. F.

ORG: Moscow State University (Moskovskiy gosudarstvennyy universitet)

68
B

TITLE: Observation of nonlinear boundary effects in the radio frequency band

SOURCE: IVUZ. Radiofizika, v. 9, no. 4, 1966, 757-764

TOPIC TAGS: coherent light, coherent signal, radio signal effect, transmission line, nonlinear effect, pn junction, optic dispersion, FREQUENCY BAND

ABSTRACT: The authors make use of the analogy between interaction of coherent light waves in nonlinear crystals and interaction of radio waves in transmission lines with nonlinear parameters to investigate surface effects on the boundary separating a linear medium from a nonlinear one. This effect is too small to investigate by purely optical means. An advantage of the radio approach is that establishment of the phase, determination of the reflected wave, and effects of the discreteness of the medium are easier to study than in the optical range. The authors therefore investigated experimentally surface effects such as generation of the second harmonic and of the combination frequency on the boundary of a weakly linear quadratic medium comprising a transmission line whose capacitance is a linear function of the applied voltage. These transmission lines were essentially periodic low-pass filters, in which the nonlinear capacitors used were p-n junctions of diodes. Oscillograms of the amplitude and phase distributions of the fundamental and of the second harmonic

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UDC: 621.371.134

L 07576-67

ACC NR: AP6026936

are presented. The theoretical formula for the amplitude of the reflected wave, based on continuity of the voltages and currents on the separation boundary, is found to be in agreement if the ratio of the minus first and zeroth harmonics is less than approximately 0.1 when spatial dispersion can be neglected. It is indicated that measurment of the nonlinear surface effect can serve as a method of quantiatively estimating the spatial dispersion in crystals. The authors thank S. D. Gvozdover for interest in the work and V. G. Titov for help with the experiments. Orig. art. has: 6 figures and 3 formulas.

SUB CODE: 09, 20/ SUBM DATE: 14Oct65/ ORIG REF: 004/ OTH REF: 004

Card 2/2

MARCHENKO, V. F.

PROCESSES AND PROPERTIES INDEX

The chemical nature of the antigens used in the sero-
diagnosis of syphilis. II. Lipoid antigens from human 6
organs. M. I. Ravich-Shcherbo, V. F. Marchenko and
N. V. Nartsisov. *Z Microbiol. Epidemiol. Immunitäts-*
forsch. (U. S. S. R.) **17**, 131-9(in German 139)(1936).—
Lipoid antigen was isolated from the human heart, the 1st
suprarenal gland, the brain, the 2nd suprarenal gland, the
kidneys, from egg yolks and from the chancre of a syphili-
tic rabbit. A "combined antigen" was prepd. from the
first 3. The percentage of cholesterol in the above 8 7
antigens was found to be 0.96, 0.91, 7.08, 9.01, 5.84,
12.11, 10.00 and 1.99, resp. The percentage of lecithin
(as phosphatide) was found to be 1.00, 0.10, 1.09, 0.90,
1.91, 3.25, 5.73 and 0.51, resp. The percentage of re-
ducing substances (calcd. as glucose) was found to be
11.75, 1.86, 8.69, 19.18, 10.66, 18.63, 29.62 and 8.13,
resp. The antigens possessing the greatest activity were
found to be those contg. a minimum of neutral fats, a
large amt. of phosphatides and a medium amt. (120- 8
170 mg. %) of cholesterol. The exts. of the kidneys
and suprarenal glands are the most satisfactory, and can
find practical application in the serodiagnosis of syphilis.

S. A. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

9.6180

26827

S/139/61/000/003/007/013
E073/E335

AUTHORS: Gorodetskiy, A.F., Baranovskiy, S.N. and Marchenko, V.G.

TITLE: Investigation of the Strain-gauge Properties of Semiconductors
I. Germanium

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1961, No.3, pp.66-70

TEXT: Published work of various authors indicates that in principle it is possible to use semiconductors for strain gauges. In earlier work of A. F. Gorodetskiy, S. S. Gutin, I. G. Mel'nik, M. G. Serbulenko, V. S. Shadrin (Ref.4: Izvestiya vuzov, Fizika No.4, 91, 1958; Ref.10: A. F. Gorodetskiy, G. N. Guk, B.I.Puchkin, Fizika tverdogo tela "Solid State Physics", Symposium, Vol.1, 1959) it was established that vacuum-deposited germanium films had a strain sensitivity of 30 - 60 units and preliminary experiments with single-crystal germanium plates have shown that their strain sensitivity is of the order of 100 and more. In this case, the strain sensitivity S is defined by $S = \Delta R/R\varepsilon$, where

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Investigation of ... 26027 S/139/61/000/003/007/013
E073/E335

ΔR is the increase in resistance during strain by pure tension or compression, R is the initial resistance and ε the relative strain. In view of the fact that the strain sensitivity of wire strain gauges is of the order of about 2, it can be anticipated that semiconductor strain gauges will yield a signal which may be higher by two orders of magnitude (Ref.11: W. P. Mason, Bell Laboratories Record, January, 1959). In this paper the results are given of systematic investigations which were aimed at determining the possibility of producing semiconductor strain gauges with a high signal output. Data are given on the strain-gauge properties of germanium films deposited in vacuum on a neutral base and of single crystal germanium specimens. The germanium films, 4 x 20 mm^2 or 2.5 x 14 mm^2, were deposited through a stencil onto glass, which was subsequently strained by tension, compression and bending. Metallic spots were also vacuum-deposited onto the condensed germanium layers to serve as leads. During deposition the vacuum was between the limits 1×10^{-4} to 5×10^{-5} mm Hg. The conductivity of all the films was of the hole type. The single crystals of electron germanium were in the form of rectangular

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Investigation of 26027 S/139/61/000/003/007/013
E073/E335

strips, 3-5 mm wide, 10-12 mm long and about 0.25 mm thick with specific resistivities of 3 and 30 Ω cm. Current-conducting leads were soldered-on after etching, using tin of 99.999% purity with zinc chloride as a flux. The single crystals were glued-on to the glass beams. The strain was determined from the sag by means of a thickness-metering instrument with an accuracy of 1 μ. The resistance was measured with an accuracy of ±0.5%. In the case of films, S values up to 100 were obtained, whilst in the case of N-type low-resistance germanium single crystals S values of up to about 150 were obtained. In both cases, the increase in resistance proved to be a linear function of the strain for ε values of up to 6.65×10^{-4} in the case of germanium films and 3.2×10^{-4} in the case of single crystals. The S values dropped sharply with increasing temperature. The basic characteristics of the investigated specimens were found to be stable, provided the temperature was maintained constant. It is concluded that both vacuum-deposited films and single crystals are suitable for use as strain gauges with a high signal output. There are 9 figures and 11 references: 5 Soviet

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Investigation of 26027 S/139/61/000/003/007/013
E073/E335

and 6 non-Soviet. The three English-language references quoted are: Ref.5 - C. Herring - Bell Syst. Techn. Journ., Vol.34, 237, 1955; Ref.6 - C. Herring, E. Vogt - Phys. Rev., 101, No.3, 944, 1956; Ref.11 - W. P. Mason (quoted in text).

ASSOCIATION: Novosibirskiy elektrotekhnicheskiy institut (Novosibirsk Electrotechnical Institute)

SUBMITTED: May 9, 1960

Card 4/4

YEVDOKIMENKO, A.I.; KOTLYARENKO, V.V.; Prinimali uchastiye: RABICHEVA, L.M.; SYROVEGINA, K.V.; LEVIN, I.Kh.; GAVRILENKO, A.F.; RYABOV, A.V.; ALYUSHIN, Ye.I.; MARCHENKO, V.G.; BOLOTIN, L.G.; AFONIN, P.I.; SEVER'YANOV, G.N.

Heat exchange and the condensation of zinc vapor in drop condensers. Sbor. nauch. trud. Gintsvetmeta no.19:536-549 '62. (MIRA 16:7)

1. Sotrudniki Gosudarstvennogo nauchno-issledovatel'skogo instituta tsvetnykh metallov (for Rabicheva, Syrovegina, Levin, Gavrilenko, Ryabov). 2. Belovskiy tsinkovyy zavod (for Alyushin, Marchenko, Bolotin, Afonin, Sever'yanov).

PINAYEV, A.K.; FEL'METSGER, V.I.; POLETAYEV, G.S.; MARCHENKO, V.G.; Prinimali uchastiye: RABICHEVA, L.M.; SYROVEGINA, K.V.; AFONIN, P.I.; SHNAYDER, I.F.; BOLOTIN, L.G.

Electrothermic method of obtaining zinc. TSvet.met. 36 no.2: 25-30 F '63. (MIRA 16:2)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut tsvetnykh metallov (for Rabicheva, Syrovegina, Levin). 2. Belovskiy tsinkovyy zavod (for Afonin, Shnayder, Bolotin).
(Zinc—Electrometallurgy)

BAKANOV, R.A.; BURYAKOV, Yu.F.; VAKHMISTROV, V.V.; VOLODIN, N.V.; KUROCHKIN, V.D.; SAVELOV, V.P.; SUDZILOVSKIY, G.A.; MARCHENKO, V.G., red.; BALASHOVA, M.V., red.-leksikograf; BERDNIKOVA, N.D., red.-leksikograf; CHAPAYEVA, R.I., tekhn. red.

[Concise English-Russian and Russian-English military dictionary] Kratkii anglo-russkii i russko-angliiskii voennyi slovar'. Moskva, Voen.izd-vo M-va oborony SSSR, 1963. 560 p. (MIRA 16:4)

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L 47079-66 EWT(1)/EWP(f)/T-2 WW

ACC NR: AP6029043 SOURCE CODE: UR/0413/66/000/014/0059/0060

INVENTOR: Klimov, L. Ya.; Obukhov, N. Ya.; Vlasov, P. K.; Yakovleva, O. A.; Marchenko, V. G.; Timofeyev, V. F.

ORG: none

TITLE: Device for sealing gas compressor shaft. Class 27, No. 183876

SOURCE: Izobret prom obraz tov zn, no. 14, 1966, 59-60

TOPIC TAGS: gas compressor, cooling compressor, compressor shaft, compressor shaft sealing, gas compressor shaft, sealing device

ABSTRACT: A device for sealing a gas compressor shaft contains soft stuffing boxes with chambers for supplying oil and an oil pump for maintaining a given pressure in the stuffing box chambers. In order to ensure the sealing of an idle compressor, an independent oil system in a form of a compressed air source (tank) connected through pressure reducer to the oil supply is connected to the stuffing box chambers. (see Fig. 1). In a variation of this device, the seal lubricant supply line has a pres-

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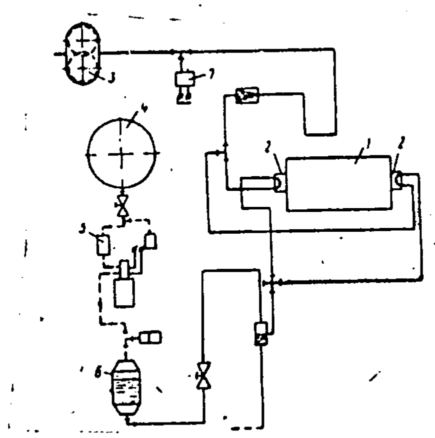

Fig. 1. Sealing device

1 - Compressor; 2 - soft stuffing box;
3 - oil pump; 4 - pressure source;
5 - pressure reducer 6 - oil tank;
7 - pressure transducer.

sure transducer which actuates the air supply from the tank to the oil container when the oil pressure in the sealing chamber drops. Orig. art. has: 1 figure. [AV]

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