L 13565-65 S/0109/64/009/010/1878/1882

ACCESSION NR: AP4046690

AUTHOR: Zlotnik, B. M.; Levin, B. R.

TITLE: Energy spectra of code sequences with a constant weight

SOURCE: Radiotekhnika i elektronika, v. 9, no. 10, 1964, 1878-1882

TOPIC TAGS: signal spectrum, signal energy spectrum

ABSTRACT: The energy spectrum of a signal encoded by a binary code having a constant weight (number of units in the code word) is theoretically determined. Such an encoded signal is considered as a pulsed random process which represents sequences of independent code words having length n and number of units $N = n/2$; the code alphabet contains $\binom{n}{N}$ words, and the occurrence of each word is equally probable. Each word consists of a packet of N square pulses representing code units in their proper positions. Formulas and a curve for the energy spectrum are presented. Orig. art. has: 2 figures and 15 formulas.

ASSOCIATION: none

SUBMITTED: 29Oct63 ENCL: 00

SUB CODE: EC, DP NO REF SOV: 002 OTHER. 000

Card 1/1

ACCESSION NR: AP4014671 S/0108/64/019/001/0013/0017

AUTHOR: Levin, B. R. (Active member); Fomin, Ya. A. (Active member)

TITLE: Distribution of duration of peaks of the sinusoidal-signal-plus-normal-noise envelope over the threshold level

SOURCE: Radiotekhnika, v. 19, no. 1, 1964, 13-17

TOPIC TAGS: communication theory, signal plus noise envelope, normal stationary noise, peak duration distribution

ABSTRACT: This is a continuation of a previous work (Radiotekhnika, v. 18, no. 5, 1963) based on S. O. Rice's findings (BSTJ, v. 37, no. 3, 1958). The unknown probability density and integral function of peak-duration distribution are represented analytically by an approximation method which involves these considerations: (1) In the region of short-duration peaks, the distribution function can be evaluated with sufficient accuracy by its first approximation;

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ACCESSION NR: AP4014671

(2) In the long-duration region, the function decreases exponentially; (3) The area under the distribution curve is equal to 1; (4) The first moment of the probability density is equal to a known value of the mean peak duration. Approximation formulas are presented. A "satisfactory agreement" is claimed between the data estimated by the above method and that experimentally obtained by V. I. Tikhonov (UFN, v. 78, no. 3, 1962). Orig. art. has: 3 figures and 12 formulas.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi (Scientific and Technical Society of Radio Engineering and Electrocommunication)

SUBMITTED: 18Feb63 DATE ACQ: 07Feb64 ENCL: 00

SUB CODE: CO NO REF SOV: 003 OTHER: 001

Card 1 2/2

L 10406-65 EWT(1)/EEC(b)-2/EWA(h) Pm-4/Po-4/Pq-4/Pg-4/P1-4/Peb RAEM(e)

ACCESSION NR: AP4045472 S/0108/64/019/009/0053/0060

AUTHOR: Byaly*y, L. I. (Active member); Levin, B. R. (Active member) B

TITLE: Evaluating the parameter of distribution of reliability on the basis of test results [Report at the Conference devoted to "Methods of testing electronic components for reliability, life, parameter stability, and methods of quick tests," Leningrad, 18Mar60]

SOURCE: Radiotekhnika, v. 19, no. 9, 1964, 53-60

TOPIC TAGS: reliability prediction, reliability test, reliability evaluation

ABSTRACT: In W. Weibull's distribution of the probability of faultless operation (J. Appl. Mech., v. 18, no. 3, 1951),

$$P(t>T)=p(T)=e^{-T^{\alpha}/t^{*}},\quad \alpha>0,\ t^{*}>0,\ T>0$$

the parameter t^{*} can be determined for one lot of the product if the other

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L 10406-65
ACCESSION NR: AP4045472

parameter α is known (an a-priori value assigned). The present article offers an evaluation of the parameter t^* on the basis of the maximum-likelihood method applied to the results of many tests performed in the course of the production process, individual tests have different durations and involve various numbers of test specimens. Formulas for evaluating t^* and its dispersion are supplied. Orig. art. has: 40 formulas.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi (Scientific and Technical Society of Radio Engineering and Electrocommunication)

SUBMITTED: 31Jul63 ENCL: 00

SUB CODE: EC NO REF SOV: 000 OTHER: 007

Card 2/2

LEVIN, B.R.; FOMIN, Ya.A.

Dispersion of the time modulation of coincidence pulses in presence of a strong signal. Elektrosviaz' 19 no.6:72-73 Je '65. (MIRA 18:6)

L 48595-65 EWT(1)/EEC(b)-2/EWA(h) Pz-4/Po-4/Pq-4/Pg-4/Peb/Pl-4

ACCESSION NR: AP5013503 UR/0108/65/020/004/0003/0020

AUTHOR: Levin, B. R. (Active member); Ushakov, N. A. (Active member)

TITLE: Some aspects of the current status of the problem of reliability

SOURCE: Radiotekhnika, v. 20, no. 4, 1965, 3-20

TOPIC TAGS: electronic equipment

ABSTRACT: In an article submitted at the invitation of the editors of *Radiotekhnika* (a publication of the A. S. Popov Society), an attempt is made to evaluate the present status of electronic equipment reliability. It can be seen from their explanation that, in general, the Soviet approach is quite similar to (and probably heavily influenced by) the U. S. approach; the availability of the proceedings of eleven U. S. reliability symposia is mentioned in the foreword.

A considerable part of this review is devoted to a discussion of the use of standby components and systems, which is considered to be one of the most efficient means of increasing the reliability of electronic equip-

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L 48595-65

ACCESSION NR: AP5013503

ment. Component redundancy is preferred for economy reasons. (The following example is given: In order to achieve a reliability factor of 0.99 for a system consisting of 100 components each of which has a reliability factor of 0.9, it is necessary to have seven sets of such components; system redundancy would require the presence of 2 x 10 systems.) The development of methods of accelerated testing with forced operational conditions to obtain statistical reliability data in a comparatively short time is considered to be the most important problem. A prospective method of reliability analysis involves simulation of the processes being studied to obtain criteria for probability distributions of failures in complex systems and "playback" of the normal and failure processes in machine time rather than in real time. The authors present some standard data on the reliability of electronic components and systems. Although their origin is not identified, a review of these data is of interest for comparative purposes.

The approximate proportions of components used in communication and radar equipment, for example, are as follows: resistors, 40%; capacitors, 30%; vacuum tubes, 6%; chokes and transformers, 5%; and semi-

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conductor devices, 3% [The 16% not accounted for are probably other, nonelectronic, components]. In such equipment vacuum tubes are responsible for the majority of failures (60%), while resistors and capacitors cause only 6% of all failures. Replacement of components because of aging and changes in parameters beyond tolerance limits occurs 4—5 times as frequently as replacement due to failure. The following 1963 data are given on the reliability of some types of components with respect to their functioning time prior to first failure: magnetrons, 10^4 hr; vacuum tubes, 5.3×10^5 hr; semiconductor devices, 10^6 hr; transformers, 5×10^6 hr; resistors and capacitors, 10^7 hr.

Mean time before failure in a system without redundancy which consists of 100,000 series components is evaluated as being on the order of several tens of hours.

To increase reliability, "rationally designed" equipment is expected to operate with a load of 0.4—0.8 of the maximum value for a given component.

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The failure rate in mobile ground, airplane, and rocket equipment increases by factors of 25, 100, and 1000, respectively, as compared to performance of the same equipment under laboratory conditions.

The following table contains reliability data pertaining to various design methods, taken (according to the reference given) from a Soviet source . (Shishonk, N. A., ed. Osnovy teorii nadezhnosti i ekspluatatsii radioelektronnoy tekhniki (Fundamentals of the theory of reliability and exploitation of radioelectronic equipment). Izd-vo "Sovetskoye radio," 1964.

Reliability data

Method	Density of elements in 1 cm^3	Average time preceding failure (hr)
Miniature component	0.2	0.2×10^6
Microminiature component	2	10^6
Micromodule	20	10^7
Miniaturized circuit	100	10^7
Integrated circuit	3000	10^7

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ACCESSION NR: AP5013503

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The article gives credit to the West for initiation of college and university training of reliability specialists who will combine a knowledge of the principles of electronic circuits with advanced mathematical knowledge in probability theory and statistics. It is stated that in the USSR reliability has not yet been introduced as a subject in higher educational establishments, except for theoretical courses which are being given in some technical schools. Conferences and seminars on reliability are held regularly at Moscow State University and at the Council on Cybernetics of the Academy of Sciences USSR.

The reliability Committee of the All-Union Council on Scientific and Technical Education (VSNTO), the Moscow and Leningrad Sections of the A. S. Popov Society, and the Reliability Section of the Polytechnic Museum in Moscow receive credit for "propaganda on reliability problems." A concluding statement stresses the importance of designing reliability into a system from the very first steps of its development, instead of trying to perform the impossible task of "injecting" reliability into existing equipment during testing or even during exploitation. The article is supported by a substantial bibliography on reliability containing 107 entries, 67 of

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L 48595-65
ACCESSION NR: AP5013503

which appear to be of an original nature.
Orig. art. has 8 equations and 3 tables.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A. S. Popova (Scientific Research Society for Radio Engineering and Electrical Communications)

SUBMITTED: 08Jan65 ENCL: 00 SUB CODE: EC, GO

NO REF SOV: 071 OTHER: 036 FSB, v. 1, no. 6

Card 6/6

LEVIN, B.R.; FOMIN, Ya.A.

Use of time quantification of a random process in determining the duration of the distribution of its overshoots. Radiotekhnika 20 no.10:1-8 O '65. (MIRA 18:11)

1. Deystvitel'nyye chleny Nauchno-tekhnicheskogo obshchestva radiotekhniki i elektrosvyazi.

ACC NR: AM6014907 Monograph UR/

Levin, Boris Ruvimovich

Theoretical principles of radioengineering statistics (Teoreticheskiye osnovy statisticheskoy radiotekhniki) v. 1. Moscow, Izd-vo "Sovetskoye radio", 1966. 728 p. illus., index. 13,000 copies printed.

TOPIC TAGS: random process, markov process, probability analysis, electronic engineering, radio engineering

PURPOSE AND COVERAGE: This book is intended for scientific and technical personel, teachers, fellows, and students at schools of higher education. It could serve as a manual for studies in statistical radio engineering. The book deals exclusively with problems relating to the probability analysis of electronic systems and is not concerned with statistical synthesis. The author thanks Professor I. S. Gonorovskiy for his advice and Ya. A. Fomin for his assistance.

TABLE OF CONTENTS:

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ACC NR: AM6014907

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ACC NR: AM6014907

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ACC NR: AM6014907

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ACC NR: AM6014907

Most useful designations -- 711

Subject index -- 714

AVAILABLE: Library of Congress

SUB CODE: 09, 12/ SUBMITTED: 21 Dec 65/ ORIG REF: 078

OTH REF: 079

Card 9/9

ACC NR: AT6022365 SOURCE CODE: UR/0000/66/000/000/0021/0029

AUTHOR: Levin, B. R.; Fomin, Ya. A.

ORG: none

TITLE: Using time quantization for determining the distribution of spike durations in the normal-noise envelope

SOURCE: Vsesoyuznaya nauchnaya sessiya, posvyashchennaya Dnyu radio. 22d, 1966. Sektsiya teorii informatsii. Doklady. Moscow, 1966, 21-29

TOPIC TAGS: signal noise separation, noise calculation

ABSTRACT: S. O. Rice (BSTJ, 1958, v. 37, no. 3) and other researchers solved the problem formulated in the title for the case of a high threshold and distribution of the spikes over it and the case of a low threshold and distribution of intervals between the spikes. The present article analyzes the spike distribution for any

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ACC NR: AT6022365

threshold level. The time-quantization method is based on replacing the initial continuous process with a ν-connected random sequence whose probabilistic characteristics are taken as approximate probabilistic characteristics of the initial process. In the article, formulas are derived for independent and singly-connected approximations to the spike-duration distribution, the between-spikes interval distribution, and the average duration and dispersion of spikes and intervals. The use of formulas is illustrated by an example involving a narrow-band stationary normal process with a correlation coefficient expressed as a Gaussian curve. Good agreement between the theoretical stepwise distribution and experimental points obtained by a Soviet researcher is noted. Orig. art. has: 2 figures and 19 formulas.

SUB CODE: 17, 09 / SUBM DATE: 28Apr66 / ORIG REF: 007 / OTH REF: 002

Card 2/2

L 27663-66 EWA(h)/EWT(1)

ACC NR: AP6008295 SOURCE CODE: UR/0109/66/011/003/0544/0548

AUTHOR: Levin, B. R.; Serov, V. V.

ORG: none

TITLE: Energy characteristics of a gated pulse sequence

SOURCE: Radiotekhnika i elektronika, v. 11, no. 3, 1966, 544-548

TOPIC TAGS: pulse sequence, energy spectrum

ABSTRACT: The correlation function and energy spectrum are theoretically determined of a gated Poisson-type sequence of overlapping square pulses having constant duration and unit height; the gating intervals τ have constant duration and repetition frequency. A method of tossing a τ-long segment upon the pulse sequence is used to derive the correlation function of the sequence; the correlation function proves to be a combination of an aperiodic and a periodic components: $B(\tau) = p_a(\tau) + \sum_{k=0}^{\infty} p_a(\tau)$. From this formula, the energy spectrum is deduced by using the Khinchin-Wiener theorem. Formulas and curves for the correlation function and energy spectrum are developed for a particular case when the pulse duration is equal to the gating interval. Orig. art. has: 4 figures and 16 formulas.

SUB CODE: 09 / SUBM DATE: 24May65 / ORIG REF: 003

Card 1/1 UDC: 621.374.36

LEVIN B.R.

KOSHKIN, V.K., doktor tekhnicheskikh nauk, professor, redaktor; LE-VIN, B.R., kandidat tekhnicheskikh nauk; PUL'MANOV, N.V., kandidat tekhnicheskikh nauk, retsenzent. POPOVA, S.M., tekhnicheskiy redaktor.

[Free-piston engines] Dvigateli so svobodno dvizhushchimisia porshniami. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1954. 175 p. [Microfilm] (MLRA 7:11)
(Gas and oil engines)

LEVIN, B.S.

Therapeutic diet for intestinal diseases. Feldsher & akush. No.8: 35-46 Aug 51. (CLML 21:1)

AKULOVA, R.F.; BYKHOVSKIY, Z.Ye.[deceased]; VYGODNER, Ye.B.; GOL'DFAYL', L.G.; DIK, V.G.; DMITRIYEVA, N.M.; DUBYNINA, Ye.I.; LEVIN, B.S.; NEZLIN, S.Ye.; SPERANSKIY, N.I.; SOROKINA, Ye.I.; TKACHENKO, A.F.; FREYDIN, Kh.M.; CHETVERIKOV, N.S.; VUL'FSON, I.Z., red.; KOKIN, N.M., tekhn. red.; FRONINA, N.D., tekhn. red.

[Manual for physicians on the selection of sanatoriums and health resorts] Rukovodstvo dlia vrachei po sanatorno-kurortnomu otboru. Pri uchastii R.F.Akulovoi i dr. 2 izd., dop. i ispr. Moskva, Medgiz, 1963. 511 p. (MIRA 16:12)

(SANATORIUMS)
(HEALTH RESORTS, WATERING PLACES, ETC.)

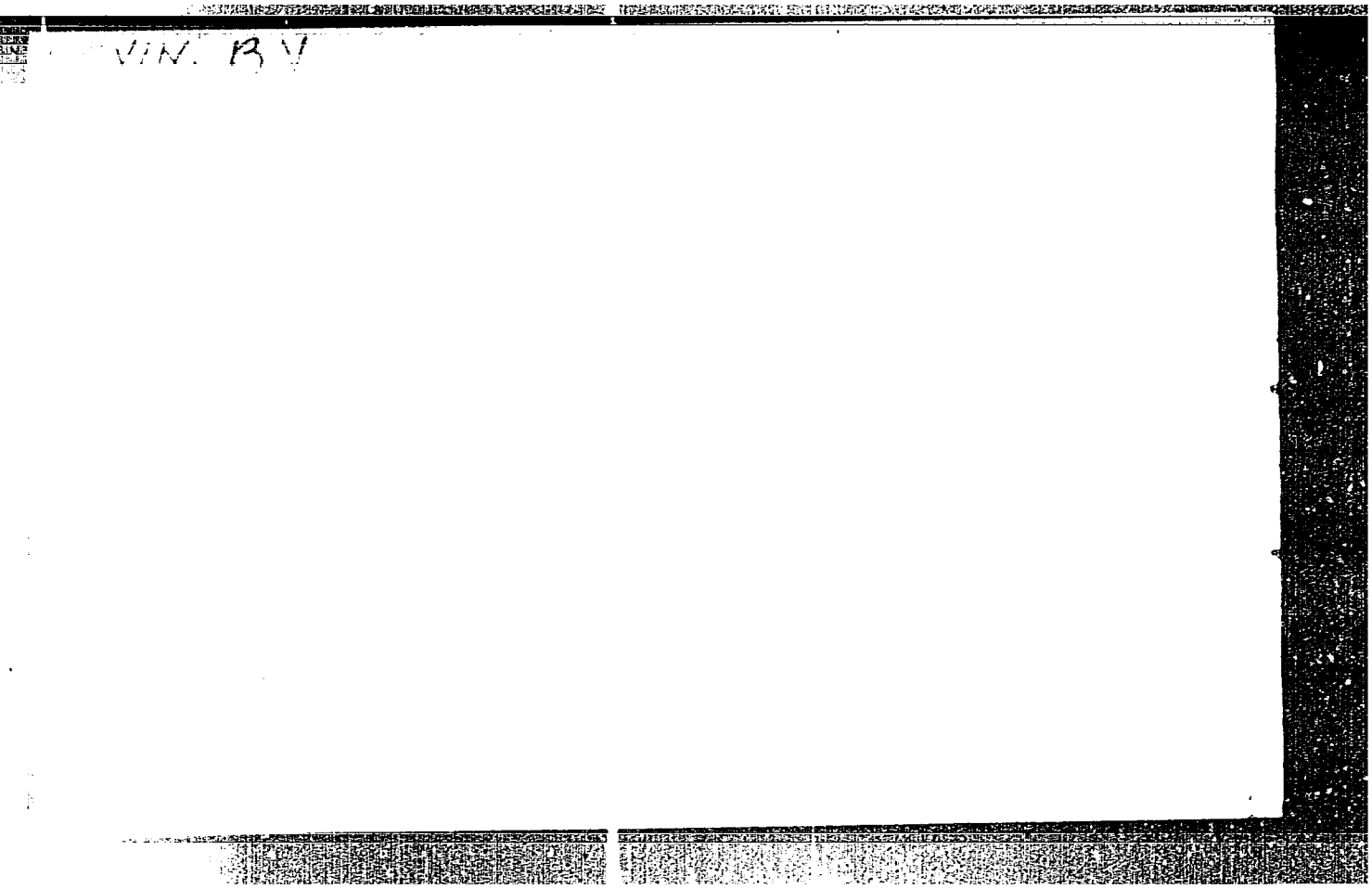
LEVIN, B. S., Candidate Med Sci (diss) -- "The effect of an apple diet on the clinical manifestations of hypertension". Moscow, 1959. 19 pp (Min Health RSFSR, State Sci Res Inst of Spa Studies and Physiotherapy), 200 copies (KL, No 23, 1959, 172)

LEVIN, B.S.

Effect of an apple diet on clinical manifestations of hypertension [with summary in English]. Vop.pit. 18 no.1:26-34 Ja-F '59. (MIRA 12:2)

1. Iz otdeleniya lechebnogo pitaniya (zav. - doktor med. nauk G.A. Samarin) TSentral'nogo instituta kurortologii, Moskva.

(HYPERTENSION, therapy,
apples (Rus))
(FRUITS,
apples, ther. of hypertension (Rus))



LEVIN, B. V.

LEVIN, B. V. - "On certain uses of modular functions in the problems of squares in arithmetic". Moscow, 1955. Min Higher Education USSR. Moscow Order of Lenin and Order of Labor Red Banner State U imeni M. V. Lomonosov. (Dissertation for degree of Candidate of Physicomathematical Science .)

SO: Knizhnaya Letopis' No. 46, 12 November 1955. Moscow

LEVIN, B.V.

Representation of numbers by quadratic forms. Trudy Inst. mat. i mekh. AN Uz. SSR no.18:123-127 '56. (MLRA 10:4)
(Numbers, Theory of)

LEVIN, B.V.

One nonlinear differential operator connected with automorphic functions. Trudy Inst. mat. i mekh. AN Uz. SSR no.18:129-138 '56. (Operators(Mathematics)) (Functions, Automorphic) (MLRA 10:4)

69753

S/043/60/000/02/04/011

16.1000

AUTHOR: Levin, B.V.

TITLE: Estimations From Below for the Number of Nearly Prime Integers Belonging to Some General Sequences

PERIODICAL: Vestnik Leningradskogo universiteta, Seriya matematiki, mekhaniki i astronomii, 1960, No 2, pp. 48-65

TEXT: Principal theorem: Let $I(z,N)$ be the number of numbers of the sequence $\{a_n\}$, $(n=\overline{1,N})$, divisible by no prime number $p_1, p_2, \ldots, p_r \leq z$. Let further

1) $f(r)$ be the number of solutions of the congruence $a_n \equiv 0 \pmod r$

2) $Z(s) = \prod_p \left(1 + \frac{1}{p^s}\right)^{f(p)}$

3) Θ - arbitrary real positive number

4) $\delta(\Theta) = \frac{e^{-kC}}{k!} \left(\frac{\Theta-1}{2}\right)^k$ for $1 \leq \Theta \leq 3$

$$\delta(\Theta) = 1 - \frac{e^{\omega k - \frac{\Theta-1}{2}}}{\pi k} (1.4k+1) \quad \text{for } \Theta \geq 2(k-1)$$

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S/043/60/000/02/04/011

Estimations From Below for the Number of Nearly Prime Integers Belonging to Some General Sequences

5) $\sigma_0(t) = \lambda \frac{(\ln \ln t')^2}{\ln t'}$, $t' = |t| + e^2$

6) $\nu \leq \frac{\lambda}{16(k+2)} - 2$

7) $F_e(y) = k \int_0^1 e^x \frac{\sin xy}{x} dx + \frac{0-1}{2} y + (5k+e+2)\text{arc tg } y + \pi k$

8) $u(y) = \int_0^1 e^x \frac{\cos xy - 1}{x} dx$

9) $\omega = \sum_{n=1}^{\infty} \frac{1}{n \cdot n!}$, C - Eulerian constant.

Let a) $f(n)$ be multiplicative, $f(p) \leq \min(m,p)$, m - fixed; b) let $Z(s)$ have a pole of k-th order in $s = 1$; c) $Z(s) \neq 0$ in $\sigma > 1 - \sigma_0(t)$; d) $Z(\sigma + it) = O((\ln t')^M)$ and $\ln Z(\sigma + it) = O((\ln t')^{\nu})$ in $\sigma > 1 - \sigma_0(t)$ and in $\sigma_0 > 1 - \frac{\sigma_0(t)}{2}$ $|t| > t_0$, respectively. Then

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Estimations From Below for the Number of Nearly Prime Integers Belonging to Some General Sequences

S/043/60/000/02/04/011

$$I(z,N) \geqslant \frac{AN}{(\ln z)^k}\left[1-\frac{2e^{\omega k-\frac{\theta-1}{2}}}{\pi\theta\delta(\theta)}\sum_{e=0}^{k-1}\left(-\frac{2}{\theta}\right)^e k\ldots(k-e)\int_0^\infty \frac{e^{ku(y)}\cos F_e(y)}{(1+y^2)^{e/2+1}}\,dy\right]+$$

$$+O\left(\frac{N}{(\ln z)^{k+1}}\right)+O\left(\frac{N(\ln\ln z)^2}{(\ln z)^{k/2+1}}\right)+O(z^\theta(\ln z)^{m+2}), \tag{3.4}$$

where $A = \lim_{S\to 1+0}\prod_p\left(1-\frac{f(p)}{p^s}\right)\zeta^k(s)$.

The theorem is applied to the Landau problem and its generalizations. The author uses the sieve of Selberg and the methods of A.I.Vinogradov. There are 14 lemmas and 3 theorems. There are 2 figures.

Card 3/3

LEVIN, B.V.

Distribution of prime numbers in an arithmetic progression.
Izv. AN Uz. SSR. Ser. fiz.-mat.nauk no.5:15-28 '61.
(MIRA 14:10)

1. Tashkentskiy gosudarstvennyy universitet imeni Lenina.
(Numbers, Prime)

LEVIN, B.V.

Reduced Landau problem and its generalization. Usp. mat. nauk 16 no.2:123-125 Mr-Ap '61. (MIRA 14:5)
(Sequences (Mathematics))

NIKOLAYEV, A.V.; RUMYANTSEVA, Z.G.; LEVIN, B.V.

Use of salicylic acid in the purification and separation of thorium. Izv. Sib. otd. AN SSSR no.9[illegible]45 '62.
(MIRA 17:8)

1. Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR, Novosibirsk.

ROMANOV, N.P.; LEVIN, B.V.

Classification of multiplicative functions and sequences of linear multiplicative operators. Nauch. trudy TashGU no.208. Mat. nauki. no.23:128-136 '62. (MIRA 16:8)

(Functions) (Operators (Mathematics))

LEVIN, B.V. (Tashkent)

Distribution of "almost primes" in polynomial sequences. Mat. sbor. 61 no.4:389-407 Ag '63. (MIRA 16:11)

NIKOLAYEV, A.V.; DURASOVA, S.A.; LEVIN, B.V.

Extraction of uranyl nitrate by undiluted tributylphosphate in laboratory columns. Izv. Sib. otd. AN SSSR no.6:102-105 '62
(MIRA 17:7)

1. Institut obshchey i neorganicheskoy khimii imeni N.S.Kurnakova AN SSSR, Moskva i Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR, Novosibirsk.

KAMENEV, V.M., inzh.; KONONENKO, G.I., inzh.; LEVIN, B.V., inzh.

Organization of the working area and the mechanization of fitting and assembling operations in the manufacture of electric and radio instruments. Priborostroenie no.4: 27-29 Ap '65. (MIRA 18:5)

LEVIN, B.V. (Tashkent)

One-dimensional lattice. Acta arithmetica 10 no.4:387-397 '65.

1. Submitted February 14, 1964.

LZVIN, B.V.

On the least almost prime number of an arithmetical progression and the sequence $k^2x^2 + 1$. Usp. mat. nauk 20 no.4:158-162 Jl-Ag '65. (MIRA 18:8)

[illegible], [illegible]

[illegible] class of [illegible] the [illegible] number [illegible] ferential equations [illegible] argument. [illegible] no.[illegible]:56-[illegible] '62.

Estimation of special [illegible] and products [illegible] to the above method. Ibid.:[illegible] ([illegible])

S/186/61/003/003/018/018
E071/E435

AUTHORS: Nikolayev, A.V., Tikhomirov, V.I., Rumyantseva, Z.G. and Levin, B.V.

TITLE: Entrapment of Alkali Cations by Uranium Peroxide Precipitates

PERIODICAL: Radiokhimiya, 1961, Vol.3, No.3, pp.372-373

TEXT: The authors investigated the entrapment of some cations of alkali metals during precipitation of uranium peroxide from uranyl sulphate solutions at 50 to 60°C with a large excess of hydrogen peroxide. The concentration of the starting solution was 20 g/l, pH = 2; of the final solution pH = 1. For the determination of sodium entrapment Na^{24} was used. The results obtained indicate that within the range investigated (0.01 to 0.02 M) the concentration of sodium in the starting solution has little influence on its entrapment in the precipitate (0.01 to 0.009% of the sodium present in the solution). For the determination of cesium its radioactive isotope was used (with and without a carrier). The experimental results indicate that: (a) entrapment of cesium by the peroxide precipitate is hundreds of times higher

Card 1/2

TIKHOMIROV, V.I.; LEVIN, B.V.; MIRONOVA, V.V.; SOLOVAYA, V.M.

Precipitation of peroxide compounds of zirconium from sulfuric acid solutions. Zhur. neorg. khim. 7 no.8:1860-1868 Ag '62. (MIRA 16:6)

1. Institut obshchey i neorganicheskoy khimii imeni N.S. Kurnakova AN SSSR.
(Zirconium compounds) (Peroxides)

S/200/62/000/009/001/001
D204/D307

AUTHORS: Nikolayev, A.V., Rumyantseva, Z.G. and Levin, B.V.

TITLE: The utilization of salicylic acid for the purification and separation of thorium

PERIODICAL: Akademiya nauk SSSR. Sibirskoye otdeleniye. Izvestiya, no. 9, 1962, 39-45

TEXT: The extraction of Th as the salicylate from solutions containing other ions was studied to collect information regarding the degree of purification of Th attainable by this method. Th could be quantitatively precipitated in the presence of Al, Ca, Mg, Mn, Pb, Ni, Cu and Cr, by salicylic acid, and without any coprecipitation of these elements. Ferric salicylate was however found to coprecipitate. At pH 4-5, addition of solid salicylic acid (A) to a solution containing 125 g U, 2.5 g Th, 0.25 g each of Mn, Pb, Ni, Cu, Mg and Cr, 1.0 g Al, 4.0 g Fe and 2.5 g Ca per liter resulted in a quantitative precipitation of Th and of Fe^{3+} salicylates. Pure Th salicylate could be obtained from a correspon-

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ding but Fe-free solution. Th could similarly be quantitatively separated from La, but only below pH 4 (~ 3.8). The recommended procedure for a quantitative separation of Th from U consists of dissolving the salts in HNO_3 or HCl, adjusting the pH to 3, boiling, adding 5 g of A per g of Th, boiling for a further 3-5 min, allowing the ppt to settle, adjusting the pH to 5, filtering in the hot, washing 5-6 times with hot aq. A, and igniting the salicylate to ThO_2. The salicylate dissolves in ether containing A, to an extent increasing with the A content in the ether, reaching 2.46% Th in ether containing 30% A (at 25°C). This may be utilized for the quantitative separation of equal amounts of Th and U, by extracting the precipitated Th salicylate with 20% ethereal A (without prior filtration) from a solution at pH 4-5. Similar separations were achieved from Zr^{95}, Cs^{137}, and Ru^{103}. Th salicylate may also be extracted with acetone (from aqueous solutions saturated with $CaCl_2$ to promote the formation of 2 layers), with quantitative separation from U, La and mesothorium I and II. Radiochemically pure Th^{232} was obtained by this method. There are 12 tables.

Card 2/3

The utilization of salicylic acid ... S/200/62/000/009/001/001
D204/D307

ASSOCIATION: Institut neorganicheskoy khimii Sibirskogo otdeleniya AN SSSR, Novosibirsk (Institute of Inorganic Chemistry of the Siberian Branch of the AS USSR, Novosibirsk)

SUBMITTED: December 19, 1961

Card 3/3

S/2062/000/006/002/003
D214/D307

AUTHORS: Nikolayev, A.V., Durasova, S.A., and Levin, B.V.

TITLE: Extractions of uranyl nitrate with undiluted TBP in laboratory columns

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Sibirskoye otdeleniye, no. 6, 1962, 102 - 105

TEXT: The extraction of $UO_2(NO_3)_2$ from its solutions by undiluted TBP was carried out in static and pulsating laboratory columns. In a static column (diameter - 38 mm, height of mass-exchange zone - 1300 mm) best results were obtained (70 % extraction) with V_{org}/V_{aq} = 6.4 - 6.0, where V is the volume of a phase). By employing $Mg(NO_3)_2$ as the salting out agent, better results were obtained, with V_{org}/V_{aq} = 2.5. Acidity of the initial aqueous phase does not appreciable influence the extraction. Higher percentage extractions were achieved using pulsating columns (diameter - 38 mm, height of mass-exchange zone - 900 mm). By including salting out agents a

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Extractions of uranyl nitrate with ... S/200/62/000/006/002/003
D214/D307

99.09 % extraction was obtained. Hence, undiluted TBP is recommended only for concentrating weak solutions of $UO_2(NO_3)_2$ but not for complete extractions. There are 3 tables.

ASSOCIATIONS: Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR (Institute of General and Inorganic Chemistry im. N.S. Kurnakov, AS USSR)
Institut neorganicheskoy khimii sibirskogo otdeleniya AN SSSR, Novosibirsk (Institute of Inorganic Chemistry Siberian Branch of the AS USSR)

SUBMITTED: October 20, 1961

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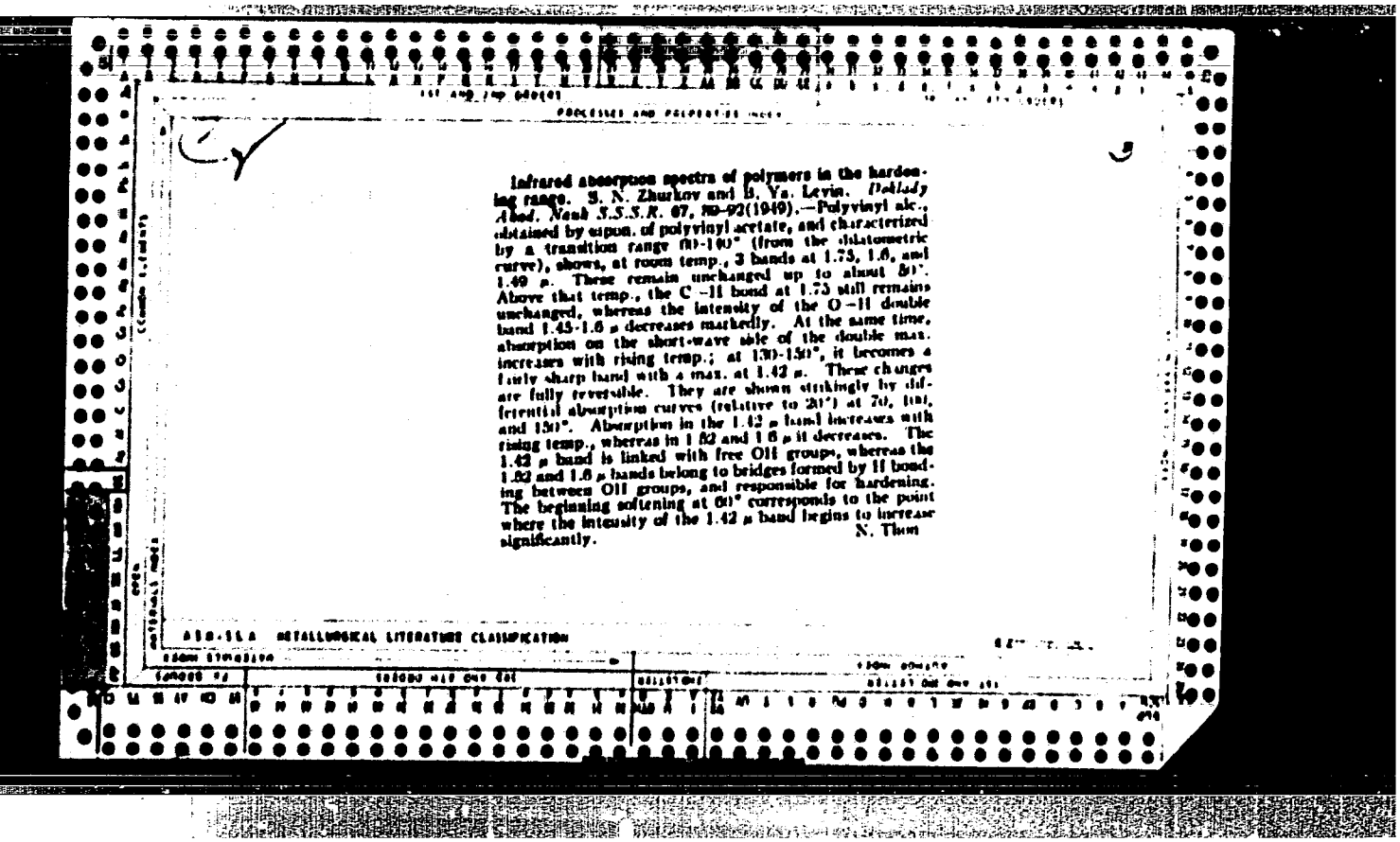

Infrared absorption spectra of polymers in the hardening range. S. N. Zhurkov and B. Ya. Levin. *Doklady Akad. Nauk S.S.S.R.* 67, 89-92(1949).—Polyvinyl alc., obtained by saponn. of polyvinyl acetate, and characterized by a transition range 80-140° (from the dilatometric curve), shows, at room temp., 3 bands at 1.75, 1.6, and 1.49 μ. These remain unchanged up to about 80°. Above that temp., the C—H band at 1.75 still remains unchanged, whereas the intensity of the O—H double band 1.45-1.6 μ decreases markedly. At the same time, absorption on the short-wave side of the double max. increases with rising temp.; at 130-150°, it becomes a fairly sharp band with a max. at 1.42 μ. These changes are fully reversible. They are shown strikingly by differential absorption curves (relative to 20°) at 70, 110, and 150°. Absorption in the 1.42 μ band increases with rising temp., whereas in 1.62 and 1.6 μ it decreases. The 1.42 μ band is linked with free OH groups, whereas the 1.62 and 1.6 μ bands belong to bridges formed by H bonding between OH groups, and responsible for hardening. The beginning softening at 60° corresponds to the point where the intensity of the 1.42 μ band begins to increase significantly.

N. Thon

LEVIN B. Ya.

3

Application of molecular spectroscopy to the study of the mechanism of vitrification. S. N. Zhurkov and B. Ya. Levin. *Vestnik Leningrad. Univ.* 1950, No. 3, 45-57; cf. C. A. 44, 7344f.—Infrared studies were made of the vitreous states of phenolphthalein, glucose, and phenol-formaldehyde condensation product. In these [illegible] H bonds are responsible for the glass form. The bonded OH group was studied in the region of the first overtone, 1.5-1.6 μ, while the nonbonded OH harmonic was investigated in the 1.4-μ region. Spectra of the compds. were taken in a temp. range 0-150° with a special app. The sample was mounted in a variable-temp. box which was attached to the monochromator, detector, and amplifier. A rotating disk with an aperture, located between the box and the source, permitted infrared radiation to fall on the specimen at [illegible] regulated by the speed of rotation of the disk. [illegible] were then taken at one wave length at a time over the range of temps. and [illegible] of percentage [illegible] found that [illegible] increased with temp. [illegible] greater and greater [illegible] of the [illegible] with [illegible] A graph is shown of [illegible] OH groups [illegible] for the 3 compds. The following [illegible] for the bands studied: D(free OH)/D(bonded OH) = [illegible] n/(1 − n), where D = optical d. [illegible] peak absorption coeffs. for free and bonded OH, n and (1 − n) = concn. of free and bonded OH groups. It was also shown theoretically and graphically that log [n²/(1 − n)] has a nearly linear dependence upon 1/temp.

R. D. Kross

LEVIN, B. YA.

(3)

Infrared absorption spectra of organic glasses in the interval of solidification. S. N. Zhurkov and B. Ya. Levin (Phys.-Tech. Inst., Acad. Sci. U.S.S.R., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 72, 269-72(1950).—Spectra of glassy phenolphthalein, glucose, and a phenol-formaldehyde resin were measured over the range 1.2–1.8 μ at temps. from 0 to 150°. Below the point of complete solidification, the spectra are unaffected by temp.; above, the absorption near 1.44 μ (free OH) increases, that near 1.55 (H-bonded OH) diminishes, that at 1.69 (CH harmonic) does not change as the temp. rises. Calcn. shows H-bond energy for all 3 to be 4.3–4.7 kcal./mole. The increase in viscosity with falling temp. in the range just above solidification is ascribed to increasing H bonding.

Gordon G. Evans

LEVIN, B. YA.

Mechanism of glass formation of simple and polymeric compounds. S. N. Zhurkov and B. Ya. Levin (Phys.-Tech. Inst., Acad. Sci. U.S.S.R., Leningrad). *Zh. Fiz. Khim.* i *Vysokomolekul. Soedinenii, Doklady 1-oi Konf. Vysokomolekul. Soedineniyam* 1952, 280–0.—By means of infrared spectra in the range from 1 to 2μ, the temp. dependence of the concn. of free and H-bonded hydroxyl groups is observed. In the case of phenolphthalein, glucose, phenol-HCHO resin, and polyvinyl alc. it is shown that the concn. of H-bonded hydroxyl groups is high and a const. below the glass transition temp. and that above this temp. the concn. of free hydroxyl groups increases. A plot of $\log[n^2/(1-n)]$ vs. $1/T$, where n is the concn. of free hydroxyl groups, gives a straight line and its slope yields an activation energy of H-bond formation of 4400, 4770, and 4300 cal./mol. for phenolphthalein, glucose, and phenol-HCHO resin, resp. On the basis of the energy of H bonding of 4700 cal./mol. and from the change of dn/dt near the transition temp., the change in sp. heat capacity for glucose is calcd. as 0.2–0.25 cal./g. degree, in good agreement with other data (0.2 cal./g. degree, Parks, *et al.*, *C.A.* 24, 5210). H. D. N.

LEVIN, B. Ya.

USSR/ Chemistry - Physical chemistry

Card 1/1 : Pub. 147 - 6/21

Authors : Levin, B. Ya.

Title : Quantitative determination of the degree of association and energy of a hydrogen bond in alcohols by the infrared spectroscopy method.

Periodical : Zhur. fiz. khim. 8, 1399-1407, Aug 1954

Abstract : Experiments were conducted to determine the quantitative concentration of hydroxyl groups of alcohols included in a hydrogen bond and to estimate the energies of such a bond. The molar absorption coefficient in the absorption maximum, which corresponds to oscillations of "free" hydroxyls for infinitely diluted alcohol solutions in carbon tetrachloride, was determined. The value of the hydrogen bond energy of n-propyl and n-butyl alcohols, was calculated. The determined values of the degree of association and dissociation and values of the H-bond energies were found to be in perfect conformity with data obtained by the thermal measurement method. Seven references: 5-USSR; 1-German and 1-English (1935-1952). Tables; graphs.

Institution : The Physico-Technical Institute, Leningrad

Submitted : July 21, 1953

LEVIN, B. Ya.

LEVIN, B. Ya.: "A study of the hardening process of organic glass". Leningrad, 1955. Acad Sci USSR, Inst of High-Molecular Compounds. (Dissertation for the Degree of Candidate of Science of Chemical Sciences)

SO: Knizhnaya Letopis', No. 41, 8 Oct 55

AUTHOR: Levin, B. Ya. SOV/57-58-8-21/37

TITLE: Glass Strength Investigation (Issledovaniye prochnosti stekla)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, Nr 8, pp. 1734 - 1739 (USSR)

ABSTRACT: The method usually employed in testing the strength of glass plates is that of bending in the direction of one axis, strip samples being used. This is a critical review of the results presented in publications. Such experiments are in reality only a test of the strength of the edges of the samples, which act as centers of destruction. For this reason a method was applied, which excludes a stressed state at the edges of the sample. A glass plate is placed upon a circular support. Thus, it was not restrained at the edge. The load was applied in the center so as to effect a uniform distribution of load. The rate of loading was kept approximately constant in all tests. The flexure strength is practically independent of the thickness of the glass within the range (0,15 - 5 mm) investigated. This, of course, applies only if the composition, the glass production technology and the surface state are identical. The main cause for the reduction of the strength by a mechanical treatment is not

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due to polishing, but to grinding. This treatment causes the strength of glass to be reduced at least by a factor of three. It can be expected that vertically drawn glass will exhibit a greater hot strength than glass polished mechanically. In order to increase the strength of vertically drawn glass it was treated with a 20% hydrofluoric acid solution. Thus the strength of etched glass was increased by a factor of eight as compared to that of mechanically polished glass. It is even higher than that of the technically hardened "Stalinit" glass type. The strength of etched glass is not reduced even if it is stored in water and in air for as long as four months. It decreases, however when the glass is kept in acetone, alcohol and crude oil for three hours. The problem was suggested by Professor S.N.Zhurkov. There are 1 figure, 4 tables, and 10 references, 9 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Physical and Technical Institute, AS USSR)

SUBMITTED: July 10, 1957

LEVIN, B.YA.

18(6) PHASE I BOOK EXPLOITATION SOV/2385

Akademiya nauk SSSR

Nekotoryye problemy prochnosti tverdogo tela; sbornik statey (Some Problems in the Strength of Solids; Collection of Articles) Moscow, Izd-vo AN SSSR, 1959. 386 p. Errata slip inserted. 2,000 copies printed.

Ed. of Publishing House: V. I. Avar'yanov; Tech. Ed.: R. S. Pevzner; Editorial Board: A.F. Ioffe, Academician; G. V. Kurdyumov, Academician; S. N. Zhurkov, Corresponding Member, USSR Academy of Sciences; B. P. Konstantinov, Corresponding Member, USSR Academy of Sciences; F. F. Vitman, Doctor of Physical and Mathematical Sciences, Professor (Resp. Ed.); L. A. Glikman, Doctor of Technical Sciences, Professor; M. A. Zlatin, Doctor of Physical and Mathematical Sciences; V. A. Stepanov, Doctor of Technical Sciences; Ya.B. Fridman, Doctor of Technical Sciences, Professor; B. S. Ioffe, Candidate of Technical Sciences (Deputy Resp. Ed.).

PURPOSE: This book is intended for construction engineers, technologists, physicists and other persons interested in the strength of materials.

COVERAGE: This collection of articles was compiled by the Otdeleniye fiziko-matematicheskikh nauk AN SSSR (Department of Physical and Mathematical Sciences) and the Fiziko-tekhnicheskiy institut AN SSSR (Institute of Applied Physics, Academy of Sciences, USSR) in commemoration of the 80th birthday of Nikolay Nikolayevich Davidenkov, Member of the Ukrainian Academy of Sciences, founder and head of the Otdel prochnosti materialov (Department of the Strength of Materials) at the Institute of Applied Physics, Academy of Sciences, USSR, founder of the Fakul'tet fiziko-mekhanicheskogo metallovedeniya (Department of Physical Metallurgy) at the Leningradskiy politekhnicheskiy institut (Leningrad Polytechnic Institute), recipient of the Stalin Prize (1943), the Order of the Red Banner of Labor (1945) and the Order of Lenin (1953). The articles deal with the strength of materials, phenomena of imperfect elasticity, temper brittleness, hydrogen embrittlement, cold brittleness, influence of deformation speed on the mechanical properties of materials, fatigue of metals, and general problems of the strength, plasticity, and mechanical properties of nonmetals. Numerous personalities are mentioned in the introductory profile of Professor Davidenkov. References are given at the end of each article.

AVAILABLE: Library of Congress

Levin, B. Ya.

PHASE I BOOK EXPLOITATION SOV/4186

Akademiya nauk SSSR

Stroyeniye veshchestva i spektroskopiya (Structure of Matter and Spectroscopy) Moscow, Izd-vo AN SSSR, 1960. 113 p. Errata slip inserted. 2,300 copies printed.

Ed.: K. V. Astakhov, Professor; Tech. Ed.: T. P. Polenova.

PURPOSE: This collection of articles is intended for physicists and chemists interested in spectroscopic methods of research on the structure of molecules and related problems.

COVERAGE: The articles contained in this collection were taken from the editorial files of the Zhurnal fizicheskoy khimii (Journal of Physical Chemistry) and are concerned with spectroscopic methods in research on the structure of molecules, the hydrogen bond, isotopic effects, problems in magnetochemistry, the structure of aqueous solutions of electrolytes, and the chemistry of complex compounds. References accompany individual articles.

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Structure of Matter and Spectroscopy SOV/4186

TABLE OF CONTENTS:

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The author thanks the following for having participated in determining the density of deuterocompounds: V. G. Golov, P. N. Nikolayev, V. I. Kucheryavyy, Ye. Z. Zhuravlev, V. I. Murzin, and L. S. Zhilkin. He thanks A. I. Brodskiy for his discussion of the results.

Structure of Matter and Spectroscopy SOV/4186

Yesin, O. A. [Ural'skiy politekhnicheskiy institut im. S. M. Kirova Sverdlovsk (Ural Polytechnic Institute imeni S. M. Kirov, Sverdlovsk)]. Form of Surface Tension Isotherms 111

AVAILABLE: Library of Congress

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B122/B063

24.4100

AUTHORS: Zhurkov, S. N., Levin, B. Ya., Sanfirova, T. P.

TITLE: Temperature - Time Dependence of the Strength of Silver Chloride

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 6, pp. 1040-1042

TEXT: The temperature - time dependence of the durability τ on the voltage applied σ with a change in the experimental temperature was studied on metals, melts, solid solutions, and polymers. In the article under review, the authors used a material with bound ions (AgCl polycrystal) to determine the constants U_0 (activation energy of the tensile test), τ_0, and γ of the function $\tau = \tau_0 \exp\left(\frac{U_0 - \gamma\sigma}{kT}\right)$. The preparation of the samples and the experimental arrangement are described in the papers of Refs. 12 and 13. The tensile tests were made between 18°C and 200°C. Investigations revealed that the dependence of τ on σ is determined by the given and usual formula for metals and alloys. τ_0 likewise has the

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S/181/60/002/009/006/036
B004/B056

24.4100

AUTHORS: Zhurkov, S. N., Levin, B. Ya., Tomashevskiy, E. Ye.

TITLE: Time Dependence of Durability Under High-vacuum Conditions

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 9, pp. 2066-2069

TEXT: In two papers by the first-mentioned author (Refs. 1, 2), the effect of the time factor upon the destruction of solids was proved. The results obtained led to the conclusion that the time dependence of durability did not depend on the surrounding medium. The present paper aimed at experimentally proving this conclusion. Investigations were carried out on the durability σ of organic glass (polymethyl methacrylate), aluminum, and silver chloride at $(1 - 3)\cdot10^{-7}$ torr and room temperature, and at $(1 - 2)\cdot10^{-6}$ torr and higher temperatures (75-80°C for organic glass, 300°C for aluminum, and 100°C for silver chloride). The testing apparatus for organic glass is schematically shown in Fig. 1, the apparatus for Al and AgCl in Fig. 2. In the case of these more solid substances the loading weight was outside the vacuum space. The authors describe the production, purification, and heat treatment of the samples. Fig. 3 presents the results obtained as $\log \tau = f(\sigma)$. The instant of time τ

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L 61848-65 EWT(m)/EWG(v)/EWP(j)/T Pc-4/Pe-5 JAJ/RM

ACCESSION NR: AP5018430 UR/0190/65/007/007/1203/1207 35
678.01:53 34

AUTHOR: Zhurkov, S. N.; Novak, I. I.; Levin, B. Ya.; Savitskiy, A. V.; Vettergren', V. I. B

TITLE: Relationship between the strength of a polymer and its molecular orientation

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 7, 1965, 1203-1207

TOPIC TAGS: capron fiber, polycaproamide fiber, polymer molecular orientation, polymer property

ABSTRACT: The tensile strength of capron (polycaproamide) fibers was studied as a function of the molecular orientation. The fibers were formed from the melt, then oriented by uniaxial stretching at temperatures from 20 to 200° C. The molecular orientation of the polymer chains was determined from polarized infrared spectra. The orientation factor $\cos^2\theta$ of segments in the amorphous and crystalline phases was measured. The correlation observed between the strength of the fiber and the orientation of the molecular chains in the amorphous portions, determined by $\cos^2\theta$, leads to the conclusion that the disordered amorphous regions of the polymer constitute

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ACCESSION NR: AP5018430

weak spots which are responsible for the strength of the fiber. The tensile strength of the fibers is a linear function of the orientation of the segments in the amorphous regions, measured by the factor $\overline{\cos^2\theta}$; the tensile strength is given by the product of the concentration of these segments N by $\overline{\cos^2\theta}$. Values of the structurally sensitive coefficient γ were determined from the tensile strength data, and the relation $\gamma = f(N\ \overline{\cos^2\theta})$ was plotted; it was found that γ varies in accordance with a hyperbolic law and undergoes little change at high degrees of stretching. Orig. art. has: 5 figures and 6 formulas.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR (Physicotechnical Institute, AN SSSR)

SUBMITTED: 03Aug64 ENCL: 00 SUB CODE: MT, OC

NO REF SOV: 008 OTHER: 000

Card 2/2

L 62697-65 EWT(l)/EWG(v)/EEC-4/EEC(t)/EWA(d) GW

ACCESSION NR: AP5013401 UR/0053/65/086/001/0041/0069
523.51

AUTHOR: Levin, B. Yu. 22
B

TITLE: The origin of meteorites

SOURCE: Uspekhi fizicheskikh nauk, v. 86, no. 1, 1965, 41-69

TOPIC TAGS: meteorite, meteorite composition, meteorite origin, asteroid, solar system, cosmogony

ABSTRACT: This is a review article reporting on the changes that have occurred in the scientific explanations of the origin and nature of meteorites during the last decades, making use of recent information on the abundance of elements and their isotopic ratios from the point of view of nuclear physics. The various hypotheses advanced concerning the nature of meteorites are outlined and the experimental and cosmogonical evidence in their favor or against them are briefly discussed. The main points of view of Urey and Ringwood, Anders, Wood, Mason, and the author of the paper are described in detail. The

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ACCESSION NR: AT5013401

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section headings are: 1. Introduction. 2. Meteorites and asteroids. 3. Atmospheric selection. 4. Cosmogonical considerations. 5. Some properties of meteorites. 6. Hypotheses of the 'fire liquid' origin of meteorites. 7. Hypotheses of primordial nature of chondrules. 8. Hypothesis of unmolten parent bodies. 9. Some conclusions. Orig. art. has: 9 figures

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00 SUB CODE: ES, AA

NR REF SOV: 029 OTHER: 105

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Card 2/2

LEVIN, B. YA

Kriteriy ermita dlya tselykh funktsiy eksponentsial'nogo tipa, I. DAN, 41 (1943), 50-54.

Obobshcheniye teoremy Gel'dera o gipertranstsendentnosti funktsii G(kh). Rostov n/D, Uchën. Zap. un-ta, 1 (1934), 79-98.

O roste tseloy funktsii po luchu i o raspredelenii yeë nuley po argumentam. Matem. SB., 2 (44), (1937), 1097-1142.

O nekotorykh arifmeticheskikh svoyatvakh golomorfnykh funktsiy. Khrk., zap. matem. T-VA (4), 15:2 (1938), 43-50.

O vekovoy konstante golomorfnoy pochti periodicheskoy funktsii. DAN., 33 (1941), 182-184.

Ob odnom obobshchenii teoremy feyera-rissa. DAN, 52 (1946), 291-294.

SO: Mathematics in the USSR, 1917-1947
Edited by Kurosh, A. G.
Markusevich, A. I.
Rashevskiy, P. K.
Moscow-Leningrad, 1948

Levin, B. Y.

Levin, B. Y. On a generalization of the Fejer-Riesz theorem. [illegible] N. S. 52 [illegible] 2?? (1946).

The theorem referred to in the title is that a nonnegative trigonometric polynomial can be written as the square of the absolute value of a trigonometric polynomial. The author uses a theorem of Wiener and Pitt [Duke Math. J. 4, 420–436 (1938)] to generalize this to functions $f(x) = \int_{-A}^{A} e^{ixt} d\sigma(t)$ in the following wa[y]. Let $\sigma(t)$ be of bounded variation, $\sigma(t) = \sigma_a + \sigma_s + \sigma_d$, where the subscripts indicate the absolutely continuous, singular and discontinuous components; let [illegible]

[illegible]

then

[illegible]

where [illegible] is of bounded variation. As an application the author proves the following theorem of [illegible] Artemenko (unpublished) [illegible] definite function on $(-A, A)$ can be extended so that it is positive definite on $(-\infty, \infty)$. The case of a continuous function was considered by M. Krein [same C. R. (N.S.) 26, 17–22 (1940); these Rev. 2, 361]. *R. P. Boas* [illegible] R. I.

Source: Mathematical Reviews [illegible]

LEVIN, B.

Krein, S., and Levin, B. On a problem of I. P. Natanson. Uspehi Matem. Nauk (N.S.) 3, no. 3(25), 153-160. 1948. (Russian)

Let $K(h, x)$ and $S(h, x)$ be two kernels defined and continuous for $0 \leq x \leq h \leq 1$. The authors discuss the problem of conditions under which

(*) $\lim_{h \to 0} \int_0^h K(h, x) f(x) dx$

implies

(**) $\lim_{h \to 0} \int_0^h S(h, x) f(x) dx$,

where $f(x)$ is integrable over $(0, 1)$. They show that if the partial derivatives $K_x'(h, x)$ and $S_x'(h, x)$ exist and are continuous for $0 < x \leq h \leq 1$, if $K(h, h) \neq S(h, h) \neq 0$ and if

$$\int_0^h |S_x'(h, x) : S(x, x)| dx < N$$

$$\int_0^h |K_x'(h, x) : K(x, x)| dx \leq q < 1$$

where N and q are independent of h, then (*) implies (**). The special case $K(h, x) = 2h/(x^2 + h^2)$, $S(h, x) = 1$ was proposed as a problem by Natanson. A. Zygmund

Source: Mathematical Reviews, Vol. 10 No. 2

LEVIN B YA

Krein, S. G., and Levin, B. Ya. On the convergence of singular integrals. Doklady Akad Nauk SSSR (N.S.) 60, 13-16 (1948). (Russian)

A singular integral is $\int_a^b \varphi_n(x, t) f(t) dt$, where the kernels satisfy (*) $\lim_{n\to\infty} \int_\alpha^\beta \varphi_n(x, t) dt = 1$ for $\alpha \leq \sigma < x \leq \beta$ [illegible] the classical problem of [illegible] [illegible] the [illegible] seek [illegible] conditions on the φ_n so that for all functions $f(x)$ of a specified class (**) $\lim_{n\to\infty} \int_a^b \varphi_n(x, t) f(t) dt = f(x)$ will hold at all points x for which $\lim_{n\to\infty} \int_a^b \Theta_\nu(x, t) f(t) dt = f(x)$, Θ_ν [illegible] being a given one-parameter family of kernels. This problem is treated in a very general setting using Banach space methods. The following is one of the theorems obtained by specializing the general results. Let φ_n, $n \geq 1$ [illegible] $\int_a^b \varphi(t) f(t) dt$ exists for every $f(t) \epsilon L^p$ which at the point $t = x$ is the derivative of its indefinite integral. Then necessary and sufficient conditions that (**) hold for all $f(t) \epsilon L^p$, $p \geq 1$ at points $t = x$ where f is the derivative of its indefinite [illegible] $\leq M$ [illegible] with M independent [illegible]

[illegible]

and [illegible] refers to all decompositions $\varphi(t) = \psi(t) + \chi(t)$ with [illegible] there exist such with finite [illegible]. This theorem extends [illegible] results [illegible] Lebesgue [Ann. Fac. [illegible] Toulouse (3) 1, 25-117 (119-128) (1909)] and [illegible] Romanovsky [Mat. Sb. 34, 35-4 (1931)] for the case $p = 1$.

A. Dvoretzky (Princeton, N. J.)

Source: Mathematical Reviews, Vol 10, No. 1

Krein, S. G., and Levin, B. Ya. On the strong representation of functions by singular integrals. Doklady Akad. Nauk SSSR (N.S.) 60, 195–198 (1948). (Russian)

[Cf. the preceding review.] The function $f(x)$ is said to be strongly represented at the point x by the singular integral with kernels φ_τ if (†) $\lim_{\tau\to 0}\int_a^b \varphi_\tau(x,t)\,|f(t)-f(x)|\,dt=0$. The problem of this paper is to obtain necessary and sufficient conditions on the φ_τ so that (†) will be implied by $\lim_{\tau\to 0}\int_a^b \Theta_\tau(x,t)\,|f(t)-f(x)|\,dt=0$, where Θ_τ $(0<\tau<1)$ is a given one-parameter family of nonnegative kernels. Using the methods of the paper reviewed above and results of M. Krein [C. R. (Doklady) Acad. Sci. URSS (N.S.) 28, 13–17 (1940); these Rev. 2, 315] on cones in Banach space, the authors obtain several results on the type of functional they are interested in, including necessary and sufficient conditions for the weak convergence to zero of certain sequences of linear functionals. Their general theorems contain as a special case the results of D. Faddeeff [Rec. Math. [Mat. Sbornik] N.S. 1(43), 351–368 (1936)] and B. I. Korenblyum [same Doklady 58, 973–976 (1947); these Rev. 9, 347] on the representation by singular integrals of functions of L^p, $p\geq 1$, at their Lebesgue points.

A. Zygmund (Princeton, N. J.)

Source: Mathematical Reviews, Vol 10, No. 1

Levin, B. Ya.

Krein, S. G., and Levin, B. Ya. On certain nonlinear questions of the theory of singular in

Mathematical Reviews.

Levin, B. A new construction of Levitan's theory of almost periodic functions. Doklady Akad. Nauk SSSR (N.S.) 62, 585–588 (1948). (Russian)

B. Levitan generalized the concept of an almost periodic function in the following way [Comm. Inst. Sci. Math. Méc. Univ. Kharkoff [Zapiski Inst. Mat. Mech.] (4) 15, no. 2, 3–34 (1938)]. An L.a.p. function will be such that (i) it is continuous, (ii) for every ϵ, $N>0$, there exists a relatively dense set of intervals $E_{\epsilon N}$ such that $\tau \in E_{\epsilon N}$ and $|x| \leqq N$ implies $|f(x+\tau)-f(x)|<\epsilon$, (iii) to an arbitrary $E_{\epsilon N}$ there exist $\eta, \mu>0$ such that $\tau' \in E_{\eta\mu}$ and $\tau'' \in E_{\eta\mu}$ imply $\tau' \pm \tau'' \in E_{\epsilon N}$. The present author gives an equivalent definition of an L.a.p. class which can be easily extended from the real axis to an arbitrary group. Define $\{\tau_n\} \to \tau_0$ to be equivalent to $\lim_n f(x+\tau_n-\tau_0)=f(x)$ for all x, and [illegible] to be equivalent to $\lim_{m,n} f(x+\tau_m-\tau_n)=f(x)$ for all [illegible] introduces a new topology on the real axis. The [illegible] announces the following theorems. (1) A necessary and sufficient condition for f to be L.a.p. is that (i) f is continuous, (ii) the above defined topology makes the real axis conditionally compact, (iii) $\tau_n \to 0$, $\tau_n' \to 0$ imply $\tau_n+\tau_n' \to 0$. The last condition implies the f-continuity of addition. Hence by the new topology the real axis is turned into a conditionally compact topological group Ω. Call its completion Γ. Then $\tau_n \to \tau_0$ implies $f(\tau_n) \to f(\tau_0)$, shows that f as a function on Γ, is continuous. It is easy to deduce that any uniformly continuous function on Ω, corresponds to a Bohr a.p. function on the real axis. Every continuous character of Γ, generates a character $e^{i\lambda x}$; the numbers λ thus obtained form a modul, which the author calls the modul of the L.a.p. function f. (2) The statement "φ is an L.a.p. function with a modul contained in that of f" is equivalent to: φ is continuous on Ω and $f(x+\tau_n) \to f(x)$ implies $\varphi(x+\tau_n) \to \varphi(x)$ for all x. The author defines integration over Γ by $\int_{\Gamma} \varphi(p)dp = \lim_{T\to\infty} \int^T \varphi(x)dx$ [illegible] and defines Fourier series and approximation in the natural way.

Frantiček Wolf (Berkeley, Calif.)

Source: Mathematical Reviews, Vol 10 No. 8

LEVIN, B.Ya.

Almost periodic Levitan functions. Ukr.mat.zhur. [1] no.1:49-101 '49.
(Functions) (MLRA 7:10)

LEVIN, B.

Krein, M., and Levin, B. On entire almost periodic functions of exponential type. Doklady Akad. Nauk SSSR 94 285 287 (1949) (Russian)

parts, and we have then $\Re a_n = (\pi/\Delta)n + \varphi(n)$, where $\varphi(x)$ is almost periodic. We have further $|\Im a_n| \leqq M$, but $\Im a_n$ is not always almost periodic. The function $f(z)$ can be written as a [illegible] product $f(z) = c\prod_{-\infty}^{\infty}(1 - z/a_n)$ (where $1 - z/0$ means z). The author announces the following [illegible] where $\psi(x)$ is almost [illegible] convergent Fourier series then [illegible] almost periodic [illegible] absolutely convergent Fourier [illegible]

Source: Mathematical Reviews, Vol 10 No. 7

Levin, B.

3d

Levin, B. On functions of finite degree, bounded on a sequence of points. Doklady Akad. Nauk SSSR (N.S.) 65, 265–268 (1949). (Russian)

It was proved by Duffin and Schaeffer [Amer. J. Math. 67, 141–154 (1945); these Rev. 6, 148] that an entire function $G(z)$ of exponential type [Russian, finite degree] less than π is bounded on the real axis if it is bounded on a real sequence $\{\lambda_k\}$ with $|k-\lambda_k|<L<\infty$ and $|\lambda_k-\lambda_n|\geq\delta>0$ for $k\neq n$. The author, evidently without knowing of the work of Duffin and Schaeffer, proves a somewhat more general result (assuming only that $h(\pi/2)+h(-\pi/2)<2\pi$, where $h(\theta)$ is the indicator function of $G(z)$ and allowing λ_k to be complex) by a quite different method based on interpolation series. He also can obtain the corresponding theorem for a half-plane.

R. P. Boas, Jr.

Source: Mathematical Reviews, Vol. 10, No. 10

LEVIN, B. Ya.

2

Source: Mathematical Reviews, Vol 11 No. 1

LEVIN, B. Ya.

USSR/Mathematics - Complex Functions Jan/Feb 50
Approximations

"A Special Class of Entire (Integral) Functions and the Extremal Properties, Connected with Them, of Entire Functions of Finite Degree," B. Ya. Levin, 40 pp

"Iz Ak Nauk SSR, Ser Matemat" Vol XIV, No 1

Gives general positions of the theory of entire (integral) functions of finite degree, which permit one to obtain various precise evaluations, that play important role in the theory of approximations (first discovered by S. N. Bernshteyn). Levin generalizes principle of Fragmen-Lindelof and theorem analogous to that of Hermite-Biler, relative to entire functions of finite degree. Submitted by Acad S. N. Bernshteyn 9 Mar 49.

LEVIN, B. Ya.

Levin, B. Ya. On a generalization of the Fourier-Plancherel transform. Učenye Zapiski Har'kov. Gos. Univ. 28, Zapiski Naučno-Issled. Inst. Mat. Meh. i Har'kov. Mat. Obšč. (4) 20, 83–94 (1950). (Russian)

The generalised Fourier transform is

$$\psi(\lambda) = \int_{-\infty}^{\infty} f(x)y(x, \lambda)dx$$

where f is in $L^2(-\infty, \infty)$, the integral is a limit in mean, and $y(x, \lambda) = e^{i\lambda x} + G(x, \lambda)$ where $G(x, \lambda)$ is of summable square over the entire $(x-\lambda)$-plane. It is shown that if the formula (1) is one-one onto its range, then the inverse exists throughout $L^2(-\infty, \infty)$ and is of the same form, with kernel $s(x, \lambda) = e^{-i\lambda x} + G_1(x, \lambda)$ where G_1 is also of summable square. Necessary and sufficient conditions are given in order that a formula of Plancherel type

$$\int_{-\infty}^{\infty} |f(x)|^2 d\sigma(x) = \int_{-\infty}^{\infty} |\psi(\lambda)|^2 d\lambda$$

should hold for some monotonic $\sigma(x)$: if these hold, $\sigma(x) = x$.

If $y(x, \lambda)$ is an integral function of x and $|y(x, \lambda)| < Me^{\alpha|x|}$ for some M, then $s(x, \lambda)$ exists and satisfies the same conditions. Generalising a theorem of Paley and Wiener [Fourier transforms in the complex domain, Amer. Math. Soc. Colloq. Publ., v. 19, New York, 1934] it is shown that, under the same conditions on y, a necessary and sufficient condition that $\psi(\lambda)$ be an exponential function of type A is that $f(x)$ vanish outside $(-A, A)$.

If $y(x, \lambda)$ is the solution of the ordinary second order differential equation $Ly + \lambda^2 y = 0$, then s is a solution of the adjoint equation $L^*s + \lambda^2 s = 0$. It is shown that all conditions are fulfilled by a solution of $y'' + p(x)y + \lambda^2 y = 0$ if $xp(x)$ is in $L(-\infty, \infty)$ and is zero for $x < 0$. *J. L. B. Cooper.*

SCIENTIFICAL REVIEW (unclassified)
Vol XIV, No 4, April 1953, pp 341-438

LEVIN B.

Baltaga, V., Drinfel'd, G., and Levin, B. Naum Il'ič Ahiezer for his fiftieth birthday. Uspehi Matem. Nauk (N.S.) 6, no. 2(42), 191-194 1 plate (1951). Russian

Current Mathematical Reviews, Vol 13 No. 1

LEVIN, B. Ya.

184T74

USSR/Mathematics - Approximation 11 Jun 51

"Certain Extremal Properties of Integral (Entire) Functions of Several Variables," B. Ya. Levin, Khar'kov Mining Inst

"Dok Ak Nauk SSSR" Vol LXXVIII, No 5, pp 861-864

Class of integral functions w(z) satisfying conditions that they have no roots in lower half-plane (Im z<0) is important in studying certain problems on distribution of the roots integral functions of one variable. Such class is shown to be closely connected with certain extremal properties of integral functions and certain

184T74

USSR/Mathematics - Approximation (Contd) 11 Jun 51

properties of this class permit obtaining very gen
precise evaluations similar to those of S. N.
Bernshteyn. Submitted by Acad S. N. Bernshteyn
11 Apr 51.

184T74

LEVIN, B. Ya.

USSR/Mathematics - Functions, Integral (Entire) 21 Jun 51

"Concerning a Class of Integral Functions," B. Ya. Levin, Khar'kov Mining Inst

"Dok Ak Nauk SSSR" Vol LXXVIII, No 6, pp 1085-1088

H-polynomials are polynomials without roots in half-plane Im $z < 0$ and belong to class $\overline{HB}$. Thus functions highest for H-polynomials in the sense of uniform convergence in each finite region form subclass $\overline{HB}$, designated by P*. Demonstrates theorem: For integral function $w(z)$ to belong to class P*, it is necessary and sufficient that it belong to $\overline{HB}$ and have the form $w(z) = w_1(z)$.

184T79

USSR/Mathematics - Functions, Integral (Entire) (Contd) 21 Jun 51

$\exp(-gz^2)$, where $w_1(z)$ is not higher than the 1st order, and g is greater than 0. Submitted by Acad S. N. Bernshteyn 11 Apr 51.

184T79

Lorin, B. Ya. The general form of special operators on entire functions of finite degree. Doklady Akad. Nauk SSSR (N.S.) 79, 397–400 (1951). (Russian)

Class P consists of entire functions of exponential type (finite degree) with no roots for $\gamma<0$ and satisfying $h(-\pi/2)\geq h(\pi/2)$, an additive homogeneous operator carrying functions of P into functions of P is a $\mathfrak{B}$-operator. $\mathfrak{B}$-operators possess a generalization of Bernstein's theorem on derivatives [Levin, Izvestiya Akad. Nauk SSSR Ser. Mat. 14, 45–84 (1950); these Rev. 11, 510]. The author characterizes those $\mathfrak{B}$-operators which are continuous in the sense that $P_n(z)\to 0$ implies $\mathfrak{B}P_n(z)\to 0$, where $P_n\to P_0$ means that

$$\lim_{n\to\infty}\sup|P_n(z)-P_0(z)|=0$$

From the Pólya representation it follows that every continuous operator is characterized by [illegible] the result of applying it to $e^{\lambda z}$. The author proves the following theorem: a continuous operator is a $\mathfrak{B}$-operator if and only if $\Phi(z,\lambda)$ belongs to P_z for $\Im z\leq 0$ and to P_z^* for $\Im z\geq 0$ and $\Phi(z,\lambda)=\Phi(z,-\lambda)$ for $\Im z\leq 0$. [illegible] for the definition of P^* see Levin, same Doklady (N.S.) 78, 1085 [1951]; these Rev. 13, 2[illegible]. It follows that the continuous $\mathfrak{B}$-operators permutable with differentiation are of the form $f(D)=\sum_{k=0}^{\infty}a_kf^{(k)}(z)$ with $F(z)$ of class P^*; those operators permutable with d/dz are also characterized. R. P. Boas, Jr. (Evanston, Ill.)

Source: Mathematical Reviews, Vol. 13 No. 2

Ahiezer, N. I., and Levin, B. Ya. On interpolation for entire transcendental functions of finite degree. [illegible] 40 [illegible] Mat. [illegible] 5 26 [illegible] 23 [illegible]

The [illegible] SSSR (N.S.) 65 [illegible] MR 10, [illegible] 12, 1001 in which they used interpolation formulas to study the growth of entire functions of exponential type less than π that are bounded or grow like a power on a sequence $\{\lambda_k\}$ such that [illegible] λ_k [illegible] and λ_k [illegible] λ_m [illegible] $(m \neq n)$. Now they replace the second condition simply by $\lambda_n \neq \lambda_m$ $(m \neq n)$. In this case the λ_n fall into groups of at most r points such that [illegible] such that $\Re(\lambda_j$ [illegible] $\lambda_n)$ [illegible] $2l$ [illegible] integer not less than $2l$. If μ_0, [illegible] are the points in a given group, the hypothesis [illegible] M is supplemented by the hypothesis that the divided differences of orders up to s of the values $f(\mu_0)$, [illegible], $f(\mu_s)$ also do not exceed M in absolute value. Then $f(z)$ is represented by an appropriate interpolation formula from which [illegible] $f(z)$ is bounded [illegible] by growth like a power [illegible]

Math

Ahiezer, N.I., Levin, B. Ya.

shows that the conclusion is growth like the same power under the conditions that for some n

$$\int_{-\infty}^{\infty} e^{-2\pi|y|}(1+y^{2n})^{-1}|f(iy)|^2 dy < \infty$$

and

$$\int_1^{\infty} u^{-2}\{\log\int_u^{\infty} e^{-\pi y}y^{-n-2}|f(-iy)| + \log\int_u^{\infty} e^{-\pi y}y^{-n-2}|f(iy)|\}dv = -\infty.$$

Finally the authors consider interpolation formulas and growth theorems when the condition of distinct λ_n is dropped. Let $M_0 \supset \cdots \supset M_p$ be a nested collection of relatively dense sets with [illegible] (termin[illegible]) [illegible] Let [illegible] such that [illegible] M [illegible] M at each point λ of M_j. If the indicator h of f satisfies [illegible] $2\pi\sum$ [illegible] then [illegible]

LEVIN, B.Ya.

USSR/Mathematics - Inequalities 1 Apr 53

"Operators That Preserve Inequalities Between Integral Functions," B. Ya. Levin, Khar'kov Mining Inst

DAN SSSR, Vol 89, No 4, pp 605-608

Discusses an additive homogeneous operator B* defined on a linear envelope of functions of class P*, which operator translates functions of class P* into functions of the same class, is defined for all integral functions f(z) possessing a majorant v(z) (i.e., $|f(z)| \leq v(z)|$), and preserves relations of majorancy (i.e. $|B^* f(z)| \leq |B^* v(z)|$ logically follows from $|f(z)| \leq |v(z)|$; e.g. the operator of differentiation is a B*-operator. Presented by Acad S.N. Bernshteyn 5 Feb 53.

256T100

256T100

LEVIN, Boris Yakovlevich; LANDKOF, N.S., redaktor; TIKHONOVA, E.P., redaktor; TUMARKINA, N.A., tekhnicheskiy redaktor

[Distribution of roots of entire functions] Raspredelenie kornei tselykh funktsii. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1956. 632 p. (MLRA 9:9)
(Functions, Entire)

Levin, B.

USSR/ Mathematics

Card 1/1 Pub. 22 - 4/54

Authors : Levin, B.

Title : Fourier and Laplace types of transformations by solving a second order differential equation

Periodical : Dok. AN SSSR 106/2, 187-190, Jan 11, 1956

Abstract : A series of theorems is presented proving the possibility of converting Fourier and Laplace transforms by solving a second order differential equation of the type $y'' - q(x)y + \lambda^2 y = 0$ where the $q(x)$ is a complex function and the λ is an arbitrary parameter. It is further assumed that $y(x, \lambda)$ is a particular solution of the equation. Six USSR references (1950-1954).

Institution : Khar'kov Mining Engineering Institute

Presented by: Academician M. V. Keldysh, October 6, 1955

LEVIN, B. Ya.

SUBJECT USSR/MATHEMATICS/Theory of functions CARD 1/2 PG - 581
AUTHOR LEVIN B.Ja.
TITLE Distribution of roots of exponential sums.
PERIODICAL Doklady Akad.Nauk 108, 20-22 (1956)
reviewed 2/1957

Notations: $n(r, \delta, \theta)$ is the number of zeros of the entire function $f(z)$ in the angle $\delta < \arg z < \theta$; the density $\Delta(\delta, \theta)$ is defined to be the limit of $n(r, \delta, \theta)/r$ for $r \to \infty$ when this limit exists. The length of the boundary arc of a convex region I between the points of contact of the normal support lines in the directions δ and θ is denoted with $s_I(\delta, \theta)$. The author introduces $\Delta(\delta+0, \theta-0)$ etc.- Let now $f(z) = \sum_{k=1}^{\infty} a_k e^{\lambda_k z}$ where $\sum |a_k| < +\infty$ and where the conjugates $\overline{\lambda}_k$ of the exponents are on the boundary of the convex closed set I; if I is the smallest set which satisfies these conditions and if the directions δ and θ are not perpendicular on the rectilinear sides of I, then the density $\Delta(\delta, \theta)$ exists and

$$\Delta(\delta \pm 0, \theta \pm 0) = (1/2\pi) s(\delta \pm 0, \theta \pm 0).$$

In the space E_J of entire functions of the type of order 1 having their indication diagram in the convex bounded region J, the author introduces the

LEVIN, B. Ya.

38-4-6/10

AUTHOR: LEVIN, B.Ya.

TITLE: A Generalization of Cartwright's Theorem Concerning an Entire Function of Finite Degree Which is Bounded on a Point Sequence (Obobshcheniye teoremy Kartrayt o tseloy funktsii konechnoy stepeni, ogranichennoy na posledovatel'nosti tochek).

PERIODICAL: Izvestiya Akad.Nauk Ser.Mat.,1957,Vol.21,Nr 4,pp.549-558 (USSR)

ABSTRACT: An entire function $\omega(z) = P(z) + i\,Q(z)$ belongs to the class P if and only if $P(z)$ and $Q(z)$ are entire functions of finite degree and if their ratio $w = \frac{Q(z)}{P(z)}$ maps the upper semiplane (z) onto the upper semiplane (w). It holds the representation

$$(1) \qquad \frac{Q(z)}{P(z)} = az + b + \frac{A_0}{z} + \sum_{-\infty}^{\infty} A_k \left[\frac{1}{z-\alpha_k} + \frac{1}{\alpha_k}\right]$$

where the α_k are the roots of $P(z)$, $a \geqslant 0$, b real and $A_k \geqslant 0$.

The following generalization of Cartwright's theorem is proved: Let $\omega(z) = P(z) + i\,Q(z)$ be an entire function of class P and let in (1) be $a = 0$. If an entire function of finite degree $f(z)$ satisfies the condition

CARD 1/3

~/0. If an entire

--- degree f(z) satisfies the condition

A Generalization of Cartwright's Theorem Concerning an Entire Function of Finite Degree Which is Bounded on a Point Sequence 38-4-6/10

$\left|\frac{f(\pm iy)}{\omega(-iy)}\right| = (e^{-\varepsilon y})$, $(y \to +\infty)$ and if for all roots α_k of $P(z)$ the inequality $|f(\alpha_k)| \leqslant |\omega(\alpha_k)|$ is satisfied, then it is

$$|f(x)| \leqslant C\,|\omega(x)|$$

where C depends on ε, p and M.

PRESENTED: By M.V. Keldysh, Academician

SUBMITTED: October 25, 1956

AVAILABLE: Library of Congress

CARD 3/3

20-5-1/54

AUTHOR: Akhiyezer, N.I. and Levin, B.Ya.

TITLE: Inequalities for Derivatives Which are Analogous to S.N. Bernshteyn's Inequality (Neravenstva dlya proizvodnykh, analogichnyye neravenstvu S.N. Bernshteyna)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 117, Nr 5, pp. 735-738 (USSR)

ABSTRACT: Let E be a perfect set of points on the real axis of the z-plane with positive harmonic measure. Let G be the complement of E, in the z-plane. The domains arising from the semiplane $\mathrm{Im}\,\zeta > 0$, from the quadrant $\mathrm{Im}\,\zeta > 0$, $\mathrm{Re}\,\zeta > 0$ or from the semistrip $\mathrm{Im}\,\zeta > 0$, $\alpha < \mathrm{Re}\,\zeta < \beta$ by an arbitrary number of rectilinear sections beginning on the basis of the domain and being perpendicular to it, are denoted as domains of the type A and B and C respectively.
Theorem: The upper semiplane $\mathrm{Im}\,z > 0$ can always be mapped conformally on a certain domain Δ of the type A,B,C so that E transforms into the basis of Δ.
The continuations of the mapping function onto G lead (with the aid of the principle of symmetry) to a function $\varphi(z)$ which is generally multivalent. Let be $\omega(z) = e^{-i\varphi(z)}$. Let

Card 1/3 $\overline{\lim_{|z|\to\infty,\, z\in G}} \frac{\ln f^{*}(z)}{|z|}$ denote the degree of $f(z)$ in G, where

Inequalities for Derivatives Which are Analogous to S.N. Bernshteyn's Inequality 20-5-1/54

it is $f^*(z) = \sup|f(z)|$ and the suprenum is taken over all the values $|f(z)|$ in z.
Theorem: $f(z)$ is assumed to be an analytic function of finite degree and to satisfy the conditions a) $|f(x)| \leqslant 1$, $x \in E$ b) To each ε there exists a δ, so that for a certain $\sigma \geqslant 0$ and $|z| \to \infty$, $|\arg z \pm \frac{\pi}{2}| \leqslant \delta$ the ratio $f^*(z) : [\omega(z)]^{\sigma+\varepsilon}$ tends to zero.
Then in every point $z \in G$ it is:

$$|f(z)| \leqslant |\omega(z)|^{\sigma}$$

and the equality sign is possible only in the case

$$f(z) = e^{i\gamma}[\omega(z)]^{\sigma}, \quad \gamma = \text{const, real}.$$

$f(z)$ is said to belong to the class K_σ $(\sigma \geqslant 0)$, if $f(z)$ in G is of finite degree, satisfies the condition a) and if it can be represented as a linear combination of two functions which satisfy b) and are real on E.
Fundamental theorem: Let be $f(z) \in K_\sigma$ $(\sigma > 0$, if Δ is of the type A,B and $\sigma \geqslant \frac{\pi}{\lambda}$, $\lambda = \beta - \alpha$, if Δ is of the type C). Then in each point

Card 2/3

Inequalities for Derivatives Which are Analogous to S.N. Bernshteyn's Inequality 20-5-1/54

in which $f'(x)$ and $\omega'(x)$ exist, it holds

$$|f'(x)| \leqslant \sigma\, |\omega'(x)| .$$

The inequality is rigorous which is proved by the function

$$f_0(z) = c_1 [\omega(z)]^{\sigma} + c_2 [\omega(z)]^{-\sigma} \qquad (|c_1| + |c_2| = 1)$$

If E consists of intervals only, then the totality of the extremum functions is depleted by the functions of the type $f_0(z)$.

Then several special cases are considered (for special E).

3 Soviet and 1 foreign references are quoted.

ASSOCIATION: State University imeni A.M. Gor'kiy, Kharkov (Khar'kovskiy gosudarstvennyy universitet imeni A.M. Gor'kogo)

PRESENTED: By S.N. Bernshteyn, Academician, 20 June 1957

SUBMITTED: 20 June 1957

AVAILABLE: Library of Congress

Card 3/3