"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SILOV, G.E.

*Šilov, G. E. Vvedenie v teoriyu lineĭnyh prostranstv. [Introduction to the theory of linear spaces.] Gosudarstv. Izdat. Tehn.-Teor. Lit., Moscow-Leningrad, 1952. 384 pp. 7.30 rubles.

This text is designed to carry students from elementary algebra and calculus up to the fundamental ideas of Fourier series, Hilbert spaces, and integral equations. The first eleven chapters, except for an occasional use of the space of continuous functions, are concerned with finite-dimensional spaces. The proofs are given in detail, with many examples and with plenty of exercises for which a student can test his understanding of the material. An outline of the material covered will help to illustrate the author's purpose.

Chapter 1: Systems of linear equations, matrices, determinants, Cramer's rule. Chapter 2: Axioms for a linear space, bases, dimension. Chapter 3: Systems of k equations in n unknowns, rank, dimension of solution set. Chapters 4–6: Linear forms and operators, change of basis, reduction of bilinear or quadratic forms to normal form. Chapters 7–8: The inner product in a Euclidean space is illustrated in N-space and in the space of continuous functions; then distance, orthogonality, and adjoint operations are defined; the Schmidt orthogonalization process is illustrated by defining the Legendre polynomials. Chapter 9: Characteristic numbers and vectors of an operator, symmetric matrices. Chapters 10–11: Reduction of quadratic forms under orthogonal transformations, minimax property of characteristic numbers; quadric surfaces in n-space, full classification with pictures for $n=3$. Chapter 12: Metric spaces and normed spaces, completeness, compactness, norm of an operator. Chapter 13: Fourier series with respect to a closed orthonormal system, trigonometric functions and Legendre polynomials, least square convergence and uniform convergence. Chapter 14: Completely continuous linear operators, their characteristic numbers and vectors, Fredholm integral equations, Sturm-Liouville operators.

For students interested in the applications of mathematics to physics or for mathematics students not yet broken to abstract axiomatic thinking, this course should furnish an excellent transition from the familiar elementary courses to the theory of linear operations. *M. M. Day.*

SO: MATH. REV., VOL. 14, NO. 9, OCT. 1953, PP. 831-934 — UNCLASSIFIED

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

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SHILOV, G.E.

(1)

Mathematical Reviews
Vol. 15 No. 4
Apr. 1954
Analysis

Šilov, G. E. **On doubly periodic vectorially smooth functions.** Ukrain. Mat. Žurnal 4, 25–35 (1952). (Russian)

Dans un mémoire antérieur [Uspehi Matem. Nauk (N.S.) 6, no. 5(45), 176–184 (1951); ces Rev. 14, 374], l'A. étudie les champs plans de vecteurs $\{u(x, y), v(x, y)\}$, assez réguliers dans un domaine pour y admettre une divergence et un rotationnel au sens généralisé. Donnons-nous alors deux fonctions réelles continues, $\mu(s, t)$, $\nu(s, t)$, périodiques (de période 2π) en s et en t, telles que:

$$\int_0^{2\pi}\int_0^{2\pi} \mu ds dt = \int_0^{2\pi}\int_0^{2\pi} \nu ds dt = 0.$$

L'auteur montre qu'il existe un champ $\{u, v\}$ et un seul, défini à une constante additive près, tel que: div $(u, v) = \mu$; rot $\{u, v\} = \nu$. *J. Kravtchenko* (Grenoble).

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. YE.

Jan/Mar 52

USSR/Mathematics - Sessions

"Four Sessions (11 Sep-20 Nov 1951) of the Scientific Council of the Institute of Mathematics, Acad Sci Ukrainian SSR"

Ukrain Mat Zhur, Vol 4, No 1, pp 104-105

The following reports were heard: B. V. Gnedenko and Ye. L. Rvacheva, "Certain Problems of Comparison of Two Empirical Distributions." G. Ye. Shilov, "Vector-Smooth Functions" (published in Usp Mat Nauk, No 5, 1951). M. A. Krasnosel'skiy and S. G. Kreyn, "Iterational Process with Minimum Residual."

PA 250T52

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. YE.

USSR/Mathematics - Torus 11 Feb 52

"Homogeneous Rings of Functions on a Torus," G. Ye. Shilov

"Dok Ak Nauk SSSR" Vol 82, No 5, pp 681-684

Describes all homogeneous rings of functions of type C on torus $T=(-n^{\leq}s, t^{\leq}n)$ included among ring C of all continuous functions on torus T and ring D_{11} of all functions with continuous right deriv in s and t. Shilov uses the terminology of his previous work (cf. "Uspekh. Matemat Nauk" 6, 1 (41), 1951). Submitted 13 Dec 51 by Acad A. N. Kolmogorov.

230T78

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

1. SHILOV, G. E.

2. USSR (600)

4. Spaces, Generalized

7. Introduction to the theory of linear spaces. G. E. Shilov. Reviewed by S. V. Fomin. Usp. mat. nauk 8, No. 2, 1953.

Subject book "Vvedeniye v Teoriyu Lineynykh Prostranstv", which is approved by the Min Higher Education USSR as a textbook for physical and physico-mathematical faculties of state universities, was published 1952 by State Tech Press, 384 pages. Reviewer states that the book is written clearly and intelligibly in good language and has an especially successful choise of problems. Concludes that subject book along with those of I.M.Gel'fand and A.I.Mal'tsev is one of the principal college texts on linear algebra.

250T101

9. Monthly List of Russian Accessions, Library of Congress, April 1953. Unclassified.

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. Ye.

116

Gel'fand, I. M., and Šilov, G. E. Fourier transforms of rapidly increasing functions and questions of uniqueness of the solution of Cauchy's problem. Uspehi Matem. Nauk (N.S.) 8, no. 6(58), 3–54 (1953). (Russian)

The methods employed by L. Schwartz in his Théorie des distributions [t. I, II, Hermann, Paris, 1950, 1951; these Rev. 12, 31, 833] are here extended to several new function-spaces and to the solution of certain problems in partial differential equations. The basic idea, which goes back to S. L. Sobolev [Mat. Sbornik N.S. 1(43), 39–72 (1936)], is to consider first a certain space Φ of "basic" (complex) functions, with a suitable topology. These functions are defined on R^N. A generalized function is then defined as a continuous linear functional T on Φ. The space of all such functionals is denoted by $T(\Phi)$. The functions in Φ are all infinitely differentiable and behave at infinity in such a way that the Fourier transform

$$\int_{R^N} \exp\{-2\pi i(s_1x_1+\cdots+s_Nx_N)\}\varphi(x)dx=\tilde{\varphi}(s)$$

is defined for all φ in Φ and is again an infinitely differentiable function with good behavior at infinity. $\tilde{\varphi}(s)$ may be defined for certain complex values $s=(\sigma_1+it_1, \sigma_2+it_2, \cdots, \sigma_N+it_N)$. (over)

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GELFAND, I. M.

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The set of all $\bar{\varphi}$ is denoted by $\bar{\Phi}$. For $T \in T(\Phi)$, the Fourier transform T is defined as the generalized function on $\bar{\Phi}$ such that $\bar{T}(\bar{\varphi}) = T(\varphi_-)$, where $\varphi_-(x) = \varphi(-x)$. For appropriate spaces Φ, every function f which is Lebesgue integrable on compact sets defines a continuous linear functional by $\varphi \to \int_{R^N} f(x)\varphi(x)dx$, and thus a Fourier transform (no longer necessarily a function) is defined for all such functions f, no matter how rapidly they increase as $|x| \to \infty$. Differentiation of generalized functions is defined by the usual formula $(\partial T/\partial x_i)(\varphi) = -T(\partial\varphi/\partial x_i)$. A function f is a multiplier for a space Φ if $\varphi \in \Phi$ implies $f\varphi \in \Phi$ and $\varphi_n \to 0$ in Φ implies $f\varphi_n \to 0$ in Φ.

Before sketching the applications to Cauchy's problem, it is necessary to list some of the spaces Φ and $\bar{\Phi}$ obtained. The first space S discussed consists of all functions φ which have partial derivatives of all orders such that φ and all partial derivatives of $\varphi \to 0$ as $|x| \to \infty$ more rapidly than any power of $|x|^{-1}$ [see L. Schwartz, loc. cit., t. II, p. 89]. A sequence $\{\varphi_n\}$ of elements of S converges to 0 if and only if for every $\epsilon > 0$, natural number r, and mixed partial derivative D^q, $(1+|x|^2)^r|D^q\varphi_n(x)| \leq \epsilon$ for all x and all $n \geq$ some $n_0(r, q, \epsilon)$. The space K consists of all $\varphi \in S$ having compact support [see L. Schwartz, loc. cit., t. I, p. 21].

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Gel'fand, I. M.

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The space K_p $(p>1)$ consists of all $\varphi \in S$ such that for all D^q, there exist constants C_1 and $C>0$ for which

$$|D^q\varphi(x)| \leq C_1 \exp\{-C|x|^p\}.$$

A sequence $\{\varphi_n\}$ in K_p converges to 0 if $\varphi_n \to 0$ uniformly in R^N and $|D^q\varphi_n(x)| \leq C_1 \exp\{-C|x|^p\}$, where C and C_1 depend upon q but not on n. The space Z^p $(p \geq 1)$ consists of all $\varphi(x) \in S$ which are extensible to analytic functions of the N complex variables

$$\{z_1, \cdots, z_n\} = \{x_1+iy_1, \cdots, x_N+iy_N\} = x+iy,$$

and such that

$$P[\varphi] = \int_{-\infty+iy}^{\infty+iy} |P(x+iy)\varphi(x+iy)|^2 dx < C_1 \exp\{C|y|^p\},$$

where P is an arbitrary polynomial and C_1 and C are constants depending upon P and φ. A sequence $\{\varphi_n\}$ in Z^p converges to 0 if $\varphi_n(Z) \to 0$ uniformly on all compact subsets of complex N-space and $P[\varphi_n] \to 0$ for all P and y. The space Z_p^p consists of all $\varphi(z_1, \cdots, z_n)$ which are analytic for all values of $z_1, \cdots, z_n$ and such that

(over)

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Gel'FAND, I. M.

415 6

$$(*) \qquad |\varphi(z_1, \cdots, z_N)| \leq K \exp\left\{\sum_{j=1}^{N} \epsilon_j C_j |z_j|^p\right\},$$

where the C_j are positive constants and $\epsilon_j = +1$ for z_j non-real and $\epsilon_j = -1$ for z_j real ($j = 1, \cdots, N$). Convergence is defined as being uniform on compact sets and with uniform maintenance of a bound (*).

The Fourier transforms of these function-spaces are next computed ($p' = p/(p-1)$): $\bar{S} = S$; $\bar{K}_p = Z^{p'}$; $\bar{Z}^p = K_{p'}$; $\bar{K} = Z^1$; $\bar{Z}^1 = K$; $\bar{Z}_p{}^p = \bar{Z}_{p'}{}^{p'}$. A detailed discussion of Fourier transforms of generalized functions for each of the function spaces is given.

The applications to Cauchy's problem follow the usual procedure. Let $u(x, t) = \{u_1(x, t), \cdots, u_m(x, t)\}$ be a vector function of $x = \{x_1, \cdots, x_N\}$ and the real variable t. Consider the system of differential equations

$$(1) \qquad \frac{\partial u(x, t)}{\partial t} = P\left(\frac{1}{2\pi i}\frac{\partial}{\partial x}, t\right) u(x, t),$$

where P is an m^2-matrix whose elements are linear differential operators of various orders multiplied by continuous functions of t. The initial condition is $u(x, 0) = u_0(x)$. This system may be regarded as a system of equations in generalized vector-functions $T(\varphi) = \{T_1(\varphi), \cdots, T_m(\varphi)\}$, the unknown function u being replaced by an unknown generalized

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Gelfand, I. M.

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function. By taking the Fourier transform, this system of equations is transformed into the system of ordinary differential equations

$$(2) \qquad \frac{dv(s,t)}{dt} = P(s,t)v(s,t), \quad (v(s,t) = \widetilde{u(x,t)}),$$

where the matrix $P(s,t)$ has elements which are polynomials in S multiplied by continuous functions of t, and the initial condition is $v(s,0) = v_0(s) = \widetilde{u_0}$.

The basic theorems are the following. Let $Q(s,t_0,t)$ be the matrix of the normal fundamental solution of the system (2): $Q(s,t_0,t_0) = E$. I. If the elements of $Q(s,0,t)$ are multipliers in Φ for all $t \geqq 0$, the system (2) has a solution with arbitrary initial generalized vector-function $v_0(s) \in T^{(m)}(\Phi)$. II. If the elements of $Q(s,t,t_0)$ are multipliers in Φ for all t, $0 \leqq t \leqq t_0$, then (2) has a unique solution in the class $T^{(m)}(\Phi)$. For every system (2), let p_0 be the greatest order of the entire functions of s entering in $Q(s,t_0,t)$. III. Then the elements of $Q(s,t_0,t)$ are multipliers in Z_r^r for all $r > p_0$. IV. If the vector-function $v_0(x)$ satisfies the inequality

$$|v_0(x)| \leqq C_1 \exp\{C|x|^{p_0'-\epsilon}\}, \quad \epsilon > 0,$$

then the system (1) has a solution in generalized vector functions belonging to $T(z_r^r)$, where $r = p_0' - \delta$, $\delta > 0$. This solution is unique. A number of other theorems are given.

E. Hewitt (Seattle, Wash.).

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G.Ye.

Certain attributes of closure and completeness of a system of functions. Nauk.zap.Kiev.un. 12 no.6:37-48 '53. (MLRA 9:11)
(Functions)

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. YE.

PA 246T92

USSR/Mathematics - Ideals Mar/Apr 53

"Expansion of a Commutative Normed Ring into a Direct Sum of Ideals," G. Ye. Shilov, Kiev

"Matemat Sbornik" Vol 32 (74), No 2, pp 353-364

Complete solution of the following fundamental problem: Will a ring R decompose into the direct sum of two of its ideals if the set of maximal ideals of ring R is nonconnected. The answer is positive. Previous results on subject ring had been inconclusive because of the unanswered question.

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. Ye.

USSR/Mathematics - Compacta 1 Sep 53

"Criterion of Compactness in a Homogeneous Space of Functions," G. Ye. Shilov

DAN SSSR, Vol 92, No 1, pp 11,12

Considers a linear complex normed space R consisting of complex-valued functions that are given in a commutative bicompact group G with additive operation sign. Purpose is to demonstrate the theorem: The criterion of compactness of a set M in R is that the conditions of boundedness of M in space R hold and the uniform continuity of the elements of M be relatively displaced. Presented by Acad A. N. Kolmogorov 27 Jun 53. 274T62

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

HALPERIN, Israel; AGRANOVICH, M.S. [translator]; SHILOV, G.Ye., redaktor; SHABAT, B.V., redaktor; BELEVA, M.A., tek[redacted]tor

[Introduction to the theory of distributions. Translated from the English] Vvedenie v teoriiu obobshchennykh funktsii. Perevod s angliiskogo M.S.Agranovicha. Pod red. G.E.Shilova. Moskva, Izd-vo inostrannoi lit-ry, 1954. 61 p. (MLRA 8:4)

(Functional analysis)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G.Ye.; GRIGOR'YEV, I.N., redaktor; AKHLAMOV, S.N., tekhnicheskiy redaktor.

[Lectures on vector analysis] Lektsii po vektornomu analizu. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1954. 138 p. (MLRA 7:9)
(Vector analysis)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G.Ye.

City mathematical seminar. Ukr. mat. zhur. 6 no.2:258 '54.
(Kiev—Mathematics) (MIRA 8:5)

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. Ye.

USSR/Mathematics - Cauchy problem FD-1167

Card 1/1 Pub. 118-8/30

Author : Kostyuchenko, A. G., and Shilov, G. Ye.

Title : Solution of the Cauchy problem for regular systems of linear equations in partial derivatives

Periodical : Usp. mat. nauk, 9, No 3(61), 141-148, Jul-Sep 1954

Abstract : The definition of a regular system of linear equations in partial derivatives was given by I. M. Gel'fand and G. Ye. Shilov in their article "Fourier transformations of rapidly increasing functions, and the problems of uniqueness of the Cauchy problem," Usp. mat. nauk, 8, No 6(58), 1953. The author in this present work demonstrates the theorem of the existence of the Cauchy problem in the classical sense under ordinary conditions. He considers the system of linear equations in partial derivatives: $u_t = L(pD, t)u$ where $u=u(x, t)$ is the desired m-dimensional vector function with components $u_1(x, t),.., u_m(x, t)$, $x=(x_1,..,x_N)$, $p=1/2\pi i$, $D=d/dx$, and L is a matrix composed of linear differential operators with coefficients depending upon only t. Five references, one French and 4 USSR (e.g. "Evaluations of the solutions of parabolic systems and some of their applications," Mat. sbor., 33(75), No 2, 1953, S. D. Eydel'man).

Institution :

Submitted : January 6, 1954

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. Ye.

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/1 PG - 408
AUTHOR ŠILOV G.E.
TITLE On conditions for the correctness of the Cauchy problem for systems of partial differential equations with constant coefficients.
PERIODICAL Uspechi mat. Nauk 10, 4, 89-100 (1955)
reviewed 11/1956

In this expository article various definitions and results on the correctness of the Cauchy problem for the system with constant coefficients

$$\partial u_j(x,t)/\partial t = \sum_{k=1}^{m} P_{jk}(i^{-1}\partial/\partial x)\, u_k(x,t), \quad j=1,\ldots,m,$$

where x is a real variable, are reviewed. Estimations of the Green's matrix and its derivatives are given for systems which the author qualifies as parabolic, and the Green's matrix for hyperbolic or "Petrovskij correct" systems are discussed. It is stated that the results can be extended to the case where x is a n-dimensional vector variable, although the proofs indicated do not work.

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. Ye.

USSR/Mathematics

Card 1/1 Pub. 22 - 10/54

Authors : Shilov, G. Ye.

Title : On a problem of quasianalyticity

Periodical : Dok. AN SSSR 102/5, 893-895, June 11, 1955

Abstract : A solution is presented for the following problem: What should the numbers M_{kp} $(k,p = 0, 1, 2....)$ be in order that a certain infinitely differentiable function $\varphi(x)$, in the range $-\infty < x < \infty$, would be congruently equal to zero, i.e., $\varphi(x) \equiv 0$. Seven references: 1 Italian, 1 French and 5 USSR (1936-1953).

Institution : M. V. Lomonosov State University, Moscow

Presented by : Academician A. N. Kolmogorov, March 8, 1955

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

GEL'FAND, I.M.; SHILOV, G.Ye.

A new method of solving a Cauchy problem related to linear partial differential equations systems in uniqueness theorems. Dokl. AN SSSR 102 no.6:1065-1068 Je'55. (MLRA 8:10)

1. Chlen-korrespondent Akademii nauk SSSR (for Gel'fand) 2. Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova
(Differential equations, Partial)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

ABRAMOV, A.A., redaktor; BOLTYANSKIY, V.G., redaktor; VASIL'YEV, A.M., redaktor; MEDVEDEV, B.V., redaktor; MYSHKIS, A.D., redaktor; NIKOL'SKIY, S.M., otvetstvennyy redaktor; POSTNIKOV, A.G., redaktor; PROKHOROV, Yu.V., redaktor; RYBNIKOV, K.A., redaktor; UL'YANOV, P.L., redaktor; USPENSKIY, V.A., redaktor; CHETAYEV, N.G., redaktor; SHILOV, G.Ye., redaktor; SHIRSHOV, A.I., redaktor; SIMKINA, Ye.N., tekhnicheskiy redaktor

[Proceedings of the all-Union Mathematical Congress] Trudy tret'ego vsesoiuznogo Matematicheskogo s"ezda; Moskva iiun'-iiul' 1956. Moskva, Izd-vo Akademii nauk SSSR. Vol.2. [Brief summaries of reports] Kratkoe soderzhanie obzornykh i sektsionnykh dokladov. 1956. 166 p. (MLRA 9:9)

1. Vsesoyuznyy matematicheskiy s"yezd. 3, Moscow, 1956.
(Mathematics)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

ABRAMOV, A.A., redaktor; BOLTYANSKIY, V.G., redaktor; VASIL'YEV, A.M., redaktor; MEDVEDEV, B.V., redaktor; MYSHKIS, A.D., redaktor; NIKOL'SKIY, S.M., otvetstvennyy redaktor; POSTNIKOV, A.G., redaktor; PROKHOROV, Yu.V., redaktor; RYBNIKOV, K.A., redaktor; UL'YANOV, P.L., redaktor; USPENSKIY, V.A., redaktor; CHETAYEV, N.G., redaktor; SHILOV, G.Ye., redaktor; SHIRSHOV, A.I., redaktor; SIMKINA, Ye.N., tekhnicheskikh redaktor

[Proceedings of the third All-Union mathematical congress] Trudy tret'ego vsesoiuznogo matematicheskogo s"ezda. Moskva, Izd-vo Akademii nauk SSSR. Vol.1. [Reports of the sections] Sektsionnye doklady. 1956. 236 p. (MLRA 9:7)

1. Vsesoyuznyy matematicheskiy s"yezd.3rd Moscow, 1956. (Mathematics)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, Georgiy Yevgeniyevich; GORYACHAYA, M.M., redaktor; GAVRILOV, S.S., tekhnicheskiy redaktor

[Introduction to the theory of linear spaces] Vvedenie v teoriiu lineinykh prostranstv. Izd. 2-oe. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1956. 303 p. (MLRA 9:11)
(Geometry, Algebraic)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G.Ye.

Theorem of the Fragmen-Lindelöf type for a system of linear partial differential equations. Trudy Mosk.mat.ob-va 5:353-366 '56. (Differential equations, Partial) (MIRA 9:9)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G.Ye.

History of the development of functional analysis in the Ukraine. Ist.-mat.issl.no.9:427-476 '56. (MLRA 9:9)
(Ukraine--Functional analysis)(Bibliography--Functional analysis)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

Šilov, G. E.

Šilov, G. E. Generalized functions and their applications in analysis. Uspehi Mat. Nauk (N.S.) 11 (1956), no. 6(72), 217–226. (Russian)

1-F\W

3

L'A. énumère (en général sans démonstration) un certain nombre de développements et applications récents de la théorie des distributions de L. Schwartz: 1) travail de Gel'fand-Šapiro sur les distributions homogènes; 2) généralisation de la transformation de Fourier et applications aux équations d'évolution (Gel'fand, Šilov et de nombreux autres auteurs Soviétiques), 3) théorème de Malgrange sur l'existence de solutions élémentaires des operateurs différentiels à coefficients constants, 4) inégalités de Hörmander et applications; 5) application des espaces nucléaires de Grothendieck à la décomposition spectrale d'opérateurs différentiels (Gel'fand-Kostyučenko).

J. L. Lions (Lawrence, Kan.).

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. E.

3

I-FW

~~Šilov, G. E.~~ On certain problems of the general theory of commutative normed rings. Uspehi Mat. Nauk (N.S.) 12 [illegible]

The author draws attention [illegible] the theory of commu [illegible]

[illegible] finite set x_1, [illegible]

[illegible] M [illegible] $M \in \mathfrak{M}$)

in a [illegible] complex space. Let f be a function [illegible] Does there exist an [illegible] that M [illegible] $M(x_1)$ [illegible] $M(x_n)$ [illegible] an affirmative [illegible] are generators of R [Mat. Sb. N.S. 32(74) (1953), 353-364, MR 14, 884, 1278]. Arens [illegible] Math. 2, 62 (1955), 204- [illegible] MR 17 [illegible] proof of the affirma- [illegible] The author points

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SILOV, G. E.

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I-FIW

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SILOV, G. E.

as $a \to$ the group identity. For $b \in G$ and $f \in R$, let

$$\|f\|_b = \inf\{\|g\| : g = f \text{ in a neighborhood on } b\}.$$

Suppose that $\|f\| = \sup\{\|f\|_b : b \in G\}$. Then R is called a homogeneous algebra of functions of type C. The author has found all such algebras of functions on the circle group that contain all infinitely differentiable functions [Uspehi Mat. Nauk (N.S.) 6 (1951), no. 1(41), 91–137; MR 13, 139]. Even for the 2-dimensional torus, the number of homogeneous algebras of type C becomes enormously larger. The author has found some such algebras [Dokl. Akad. Nauk SSSR (N.S.) 82 (1952), 681–684; MR 14, 385], and he raises the question of finding out more about homogeneous algebras of type C on compact groups in general and on the torus in particular. Sample question: what are all non-affinely isomorphic homogeneous algebras of type C on the torus that contain all functions with continuous second partial derivatives?

E. Hewitt (Seattle, Wash.).

3

T-FW

3/3

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

AUTHOR: SHILOV, G.E. 42-5-17/17

TITLE: Letter to the Editor of the Uspekhi matematicheskikh nauk (V redaktsiyu zhurnala Uspekhi matematicheskikh nauk)

PERIODICAL: Uspekhi Mat.Nauk, 1957, Vol. 12, Nr.5, pp. 270 (USSR)

ABSTRACT: The author withdraws his assertion published in Uspekhi Mat. Nauk 1957, Vol.12, Nr.1,p.246 that the paper of Ahrens and Calderon, Ann.of Math. 1955, Vol. 62, Nr.2, contains an error.

AVAILABLE: Library of Congress

1. Mathematics-USSR

Card 1/1

USCOMM-DC-54715

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SHILOV, G Ye.

16(1) PHASE I BOOK EXPLOITATION SOV/1325

Gel'fand, Izrail' Moiseyevich and Georgiy Yevgen'yevich Shilov

Nekotoryye voprosy teorii differentsial'nykh uravneniy (Some Problems of the Theory of Differential Equations) Moscow, Fizmatgiz, 1958. 274 p. (Series: Obobshchennyye funktsii, vyp. 3) 8,000 copies printed.

Eds.: Agranovich, M.S. and Stebakova, L.A.; Tech. Ed.: Kryuchkova, V.N.

PURPOSE: This book is the third of a series of five monographs on functional analysis and is intended for mathematicians and for specialists in allied sciences. To read the book it is necessary to have a good background in mathematics and a knowledge of the results presented in the second book of the series.

COVERAGE: The book deals with the application of the theory of generalized functions to two classical problems of mathematical

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

analysis: the problem of expansion of differential operators in eigenfunctions and the Cauchy problem for partial differential equations with constant coefficients or with coefficients dependent only on time. The theory of fundamental spaces of type W which is needed to study the Cauchy problem, is also presented. The authors thank those who participated in the Moscow State University seminar on generalized functions and differential equations, where many sections of this book were discussed. Special gratitude is expressed to V.M. Borok, Ya. I. Zhitomirskiy, G.N. Zolotarev, and A.G. Kostyuchenko. There are 64 references, of which 39 are Soviet, 13 English, 6 French, and 6 German.

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Preface 6

Ch. I. Spaces of Type W

1. Definitions 7

1. W_M spaces. 2. W^{Ω} spaces. 3. W_M^{Ω} spaces. 4. Problem of nontriviality of W_M^{Ω} spaces. 5. On the abound of functions in W_M^{Ω} spaces.

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of the series. In particular the book deals with the transfer of the technique of operation with generalized functions studied in the first book to more extensive classes of spaces. The basis of the theory of generalized functions is the theory of countable normal spaces, the presentation of which makes up the greater part of the book. The class of all countable normed spaces in many problems is too extensive for the theory of generalized functions. For this reason certain special types of countable normed spaces are introduced and studied. The spaces studied in this book are to be used in the third book of the series, which is to be devoted to certain applications of the theory of generalized functions to differential equations. The authors thank D.A. Raykov, B. Ya. Levin, G.N. Zolotarev, N. Ya. Vilenkina, and M.S. Agranovich for assistance in preparing the book. There are 39 references, of which 10 are Soviet, 7 English, 17 French, and 5 German.

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PHASE I BOOK EXPLOITATION 629

Gel'fand, Izrail' Moiseyevich and Shilov, Georgiy Yevgen'yevich

Obobshchennyye funktsii i deystviya nad nimi (Generalized Functions and Operations With Them) Moscow, Gos. izd-vo fiziko-matematicheskoy lit-ry, 1958. 439 p. (Series: Obobshchennyye funktsii, vyp. 1) 8,000 copies printed.

Eds.: Agranovich, M. S. and Ryvkin, A. Z., Tech. Ed.: Brudno, K. F.

PURPOSE: This book is the first of a series of five monographs on functional analysis intended for scientific workers, graduate students and senior university students in mathematics, physics and allied sciences. It can also be useful for enegineers.

COVERAGE: The basic concepts and definitions of generalized functions (distributions) are introduced, their properties described and operations with them demonstrated. Fourier transformations of generalized functions of one and of several variables, and Fourier transformations in connection

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with certain differential equations are analyzed. Generalized functions on surfaces and fundamental solutions of differential equations with constant coefficients are studied. The general theory of homogeneous generalized functions is presented. In the preface, Soviet mathematicians S. L. Sobolev, Z. Ya. Shapiro, G. Ye. Shilov and N. Ya Vilenkin are mentioned in connection with publications on generalized functions. The authors thank their co-workers, in particular V. A. Borovikov, N. Ya. Vilenkin, M. I. Grayev, M. S. Agranovich and Z. Ya. Shapiro for their assistance in preparing the book. There are 22 references, 6 of which are Soviet, 5 English, 8 French and 3 German.

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1. Fundamental and generalized functions 11
1. Introductory remarks 11
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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

NIKOL'SKIY, S.M., otv.red.; ABRAMOV, A.A., red.; BOLTYANSKIY, V.G., red.; VASIL'YEV, A.M., red.; MEDVEDEV, B.V., red.; MYSHKIS, A.D., red.; POSTNIKOV, A.G., red.; PROKHOROV, Yu.V., red.; RYBNIKOV, K.A., red.; UL'YANOV, P.L., red.; USPENSKIY, V.A., red.; CHETAYEV, N.G., red.; SHILOV, G.Ye., red.; SHIRSHOV, A.I., red.; GUSEVA, I.N., tekhn.red.

[Proceedings of the Third All-Union Mathematical Congress] Trudy tret'ego Vsesoiuznogo matematicheskogo s"ezda. Vol.3 [Synoptic papers] Obzornye doklady. Moskva, Izd-vo Akad.nauk SSSR. 1958. 596 p. (MIRA 12:2)

1. Vsesoyuznyy matematicheskiy s"yezd. 3d, Moscow, 1956.
(Mathematics--Congresses)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

VISHIK, M.I.; SHILOV, G.Ye.

I. M. Gel'fand's seminar on functional analysis and mathematical physics at the Moscow State University. Usp.mat.nauk 13 no.2:253-263 Mr-Ap '58. (MIRA 11:4)

(Functional analysis)
(Mathematical physics)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, Georgiy Yevgen'yevich; UGAROVA, N.A., red.; BRUDNO, K.F., tekhn.red.

[How to draw a graph] Kak stroit' grafiki. Moskva, Gos. izd-vo fiziko-matem.lit-ry, 1959. 22 p. (Populiarnye lektsii po matematike, no.30) (MIRA 12:9)
(Geometry, Analytic)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

GEL'FAND, Izrail' Moiseyevich; SHILOV, Georgiy Yevgen'yevich; RYVKIN, A.Z., red.; BRUDNO, K.F., tekhn.red.

[Generalized functions and operations on them] Obshchennye funktsii i deistviia nad nimi. Moskva, Gos.izd-vo fiziko-matematicheskoi lit-ry, 1959. 470 p. (Obshchennye funktsii, no.1). (MIRA 13:4)

(Functional analysis)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

GOR'KOV, Yu.A.; CHERNIN, K.Ye.; BITYUTSKOV , R.S.; KUROSH, A.G., glavnyy red.; BITYUTSKOV, V.I., red.; BOLTYANSKIY, V.G., red.; DYNKIN, Ye.B., red.; SHILOV, G.Ye., red.; YUSHKEVICH, A.P., red.; AKHLAMOV, S.N., tekhn.red.

[Forty years of mathematics in the U.S.S.R., 1917-1957; in two volumes] Matematika v SSSR za sorok let, 1917-1957; v dvukh tomakh. Moskva, Gos.izd-vo fiziko-matem.lit-ry, Vol.2. [Biobibliography] Biobibliografiia. 1959. 819 p. (MIRA 12:9)
(Mathematicians)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, G. YE.

16(0) PHASE I BOOK EXPLOITATION SOV/3177

Matematika v SSSR za sorok let, 1917-1957. tom 1: Obzornyye stat'i (Mathematics in the USSR for Forty Years, 1917-1957). Vol 1: Review Articles) Moscow, Fizmatgiz, 1959. 1002 p. 5,500 copies printed.

Eds: A. G. Kurosh, (Chief Ed.), V. I. Bityutskov, V. G. Boltyanskiy, Ye. B. Dynkin, G. Ye. Shilova, and A. P. Yushkevich; Ed. (Inside book): A. F. Lapko; Tech. Ed.: S. N. Akhlamov.

PURPOSE: This book is intended for mathematicians and historians of mathematics interested in Soviet contributions to the field.

COVERAGE: This book is Volume I of a major 2-volume work on the history of Soviet mathematics. Volume I surveys the chief contributions made by Soviet mathematicians during the period 1947-1957; Volume II will contain a bibliography of major works since 1917 and biographic sketches of some of the leading mathematicians. This work follows the tradition set by two earlier works: Matematika v SSSR za pyatnadtsat' let (Mathematics in the USSR for 15 Years) and Matematika v SSSR za tridtsat' let (Mathematics in the USSR for 30 Years). The book is divided into the major divisions of the field, i.e., algebra, topology, theory of probabilities, functional analysis, etc., and contributions and outstanding problems in each discussed. A listing of some 1400 Soviet mathematicians is included with references to their contributions in the field.

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Commutative Normed Rings SOV/4328

A. N. Kolmogorov, S. V. Fomin, A. Zigmund, P. S. Aleksandrov, B. A. Fuks, P. Khalmosh, L. S. Pontryagin, [redacted] and F. Khausdorf. There are 87 references: 38 Soviet, 23 English, 13 French, and 13 German.

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2. Maximal ideals 16
3. Abstract analytic functions 25
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8. Involution ring 57

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

SHILOV, Georgiy Yevgen'yevich; SOLODKOV, V.A., red.; GAVRILOV, S.S., tekhn.red.

[Mathematical analysis; a special course] Matematicheskii analiz; spetsial'nyi kurs. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1960. 388 p. (MIRA 13:5)

(Mathematical analysis)

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6"

"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

DIKOPOLOV, G.V.; SHILOV, G.Ye.

Correct boundary value problems in a half-space for partial differential equations with the right side. Sib.mat.zhur. 1 no.1:45-61 My-Je '60. (MIRA 13:11)
(Differential equations, Partial)
(Boundary value problems)

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

KREYN, M.G.; SHILOV, G.Ye.

Mark Aronovich Naimark; on his fifthieth birthday. Usp. mat. nauk 15 no.2:231-236 Mr-Ap '60. (MIRA 13:9)
(Naimark, Mark Aronovich, 1909-)

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84770

S/042/60/015/003/014/016XX
C111/C222

16.4600

AUTHOR: Shilov, G.Ye.

TITLE: Analytic Functions in a Normed Ring

PERIODICAL: Uspekhi matematicheskikh nauk, 1960, Vol.15, No.3, pp.181-183

TEXT: Let f(M) be defined on the bicompact $\mathfrak{M} = \mathfrak{M}(R)$ of the maximal ideals of the commutative normed ring R (cf.(Ref.1)). f(M) is called locally analytic with respect to R if to each point M_o there exists a neighborhood $U(M_o)$ and elements $x_1, \ldots, x_n \in R$ so that in $U(M_o)$ it holds:

$$(1)\quad f(M) = f(M_o) + \sum_{(k_1,\ldots,k_n)} a_{k_1\ldots k_n} (x_1(M)-x_1(M_o))^{k_1} \ldots (x_n(M)-x_n(M_o))^{k_n}.$$

Theorem 1: If the function f(M) is locally analytic with respect to the ring R, then there exists an element x in R so that $x(M) \equiv f(M)$.
A similar result is contained in (Ref.2).

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C111/C222

Analytic Functions in a Normed Ring

The proof uses the theorem of Waelbroeck (Ref.3).
Theorem 2 is the theorem of Waelbroeck (Ref.3) with a proof according to Arens and Calderon (Ref.2).
There are 6 references: 3 Soviet, 1 French, 1 German and 1 American.

SUBMITTED: October 29, 1958

Card 2/2

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

80863

S/038/60/024/03/04/008

16.3500

AUTHORS: Dikopolov, G.V., and Shilov, G.Ye.

TITLE: On Correct Boundary Value Problems for Partial Differential Equations in the Halfspace

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya matematicheskaya, 1960, Vol. 24, No. 3, pp. 369-380

TEXT: Let the space $\mathcal{H}$ consist of all square integrable functions $f(x) \equiv f(x_1, \ldots, x_n)$ in the real Euclidean $R_n = R_n(x)$ and their generalized derivatives. The space H dual to $\mathcal{H}$ in the sense of the Fourier transformation, consists of all square integrable functions $g(\sigma) \equiv g(\sigma_1, \ldots, \sigma_n)$ in the $R_n = R_n(\sigma)$ and the products of these functions with arbitrary polynomials. A vector function $v(\sigma) = (v_1(\sigma), \ldots, v_n(\sigma))$ belongs to H if all components belong to H ; analogously for $\mathcal{H}$. In $\mathcal{H}$ the authors consider the system

$$(2) \quad \frac{\partial u_j(x,t)}{\partial t} = \sum_{k=1}^{m} P_{jk}\left(i \frac{\partial}{\partial x}\right) u_k(x,t) \quad , \quad j = 1,2,\ldots,m \quad ;$$

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where P_{jk} are polynomials of at most p-th degree and the differentiation with respect to t is understood as the differentiation with respect to the parameter in the sense of the topology of $\mathcal{H}$. The dual system in H is

$$(2') \quad \frac{\partial v_j(\sigma, t)}{\partial t} = \sum_{k=1}^{m} P_{jk}(\sigma) v_k(\sigma, t).$$

Let $\lambda_1(\sigma), \ldots, \lambda_m(\sigma)$ be roots of $\det\left[P(\sigma) - \lambda E\right] = 0$ and $\operatorname{Re} \lambda_1(\sigma) \leq \leq \operatorname{Re} \lambda_2(\sigma) \leq \ldots \leq \operatorname{Re} \lambda_m(\sigma)$. Let G_j be the set in $R_n(\sigma)$ which is described by $\operatorname{Re} \lambda_j(\sigma) \leq 0$. Let to every point σ correspond the m-dimensional Euclidean space Q_a of vectors $\xi = (\xi_1, \ldots, \xi_m)$, $\|\xi\|^2 = \sum_{j=1}^{m} |\xi_j|^2$.

Let the point σ belong to G_r but not to G_{r+1}. Let the space Q_a be the direct sum of Q_a^- and Q_a^+, where Q_a^- is r-dimensional and is generated by eigenvectors and adjoined vectors which correspond to the roots $\lambda_1(\sigma), \ldots, \lambda_r(\sigma)$, while Q_a^+ is (m-r)-dimensional and is generated by the

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

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On Correct Boundary Value Problems for Partial Differential Equations in the Halfspace S/038/60/024/03/04/008

The authors give several examples of correct boundary value problems of this kind.
Yegorov and V.P. Palamodov are mentioned in the paper.
There are 4 references: 3 Soviet und 1 German.

PRESENTED: by A.N. Kolmogorov, Academician

SUBMITTED: May 14, 1959

Card 4/4

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

S/140/61/000/002/009/009
C111/C222

AUTHOR: Shilov, G.Ye.

TITLE: On the connection between the fundamental function and the fundamental solution of the Cauchy problem

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, no.2, 1961, 160-167

TEXT: Let $P(\lambda, \sigma_1, \ldots, \sigma_n) \equiv P(\lambda, \sigma) \equiv \lambda^m + \sum_{k=0}^{m-1} P_k(\sigma)\lambda^k$ be a polynomial with constant complex coefficients and of degree p in $\sigma_1, \ldots, \sigma_n$. The generalized function $E(x_0, x_1, \ldots, x_n) \equiv E(x_0, x)$ over the space K_{n+1} of the infinitely often differentiable finite functions $\varphi(x_0, x_1, \ldots, x_n) \equiv \varphi(x_0, x)$ is called the fundamental function of the polynomial $P(\lambda, \sigma)$ if it holds

$$P\left(\frac{\partial}{\partial x_0}, i\frac{\partial}{\partial x_1}, \ldots, i\frac{\partial}{\partial x_n}\right)E(x_0, x_1, \ldots, x_n) = \delta(x_0, x_1, \ldots, x_n). \quad (1)$$

The generalized function $G(t, x_1, \ldots, x_n) \equiv G(t, x)$ over K_n which depends on t as a parameter is called the fundamental solution of the Cauchy

Card 1/4

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problem for $P(\lambda, \xi)$ if for $t > 0$

$$P\left(\frac{\partial}{\partial t}, i\frac{\partial}{\partial x_1}, \ldots, i\frac{\partial}{\partial x_n}\right)G(t, x_1, \ldots, x_n) = 0 \qquad (2)$$

and for $t = 0$

$$G(0, x) = \frac{\partial G(0, x)}{\partial t} = \ldots = \frac{\partial^{m-2} G(0, x)}{\partial t^{m-2}} = 0 \qquad (3)$$

is satisfied.
The author investigates the connection between E and G.
Let $(f(x_0, x), \varphi(x_0, x))_{x_0, x}$ denote the application of the generalized function $f(x_0, x) \in K'_{n+1}$ on the $\varphi(x_0, x) \in K_{n+1}$. Let $(g(t, x), \varphi(x))_x$ be the application of the generalized function $g(t, x) \in K'_n$ depending on t as a parameter, on $\varphi(x) \in K_n$.
Theorem: Let $G(t, x)$ be the fundamental solution of the Cauchy problem for the polynomial $P(\lambda, \xi)$ being correct according to Petrovskiy. Let

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the generalized function $E(x_0,x) \in K'_{n+1}$ be constructed according to the rule

$$(E(x_0,x), \varphi(x_0,x))_{x_0,x} = \int_0^\infty (G(t,x), \varphi(t,x))_x dt. \qquad (4)$$

Then $E(x_0,x)$ -- fundamental function of $P(\lambda, \sigma)$. Inversely: If the fundamental function $E(x_0,x)$ of P can be represented in the form (4), where $G(t,x) \in K'_n$ and depends continuously on t then $G(t,x)$ is the fundamental solution of the Cauchy problem for $P(\lambda, \sigma)$.
The proof is based on two lemmas.
Lemma 1: If $P(\lambda, \sigma)$ is correct according to Petrovskiy then the corresponding fundamental solution $G(t,x)$ of the Cauchy problem for every $t \geqslant 0$ belongs to K'_n.
Lemma 2 is an assertion on the existence of a certain integral defining a functional in the space Z_{n+1} which is identical with the Fourier transformation of the functional defined by

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On the connection between... S/140/61/000/002/009/009
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$$(H(t,x), \varphi(t,x))_{t,x} = \int_0^\infty (G(t,x), \varphi(t,x))_x dt, \qquad (7)$$

where $G(t,x) \in K_n'$.

The author uses notations and notions of I.M.Gel'fand, G.Ye.Shilov (Ref.1: Obobshchennyye funktsii [Generalized functions] no.1, M., 1959). There are 5 Soviet-bloc references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im.M.V.Lomonosova (Moscow State University im. M.V.Lomonosov)

SUBMITTED: December 27, 1960

Card 4/4

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16.3500

AUTHORS: Dikopolov, G. V., Shilov, G. Ye.

TITLE: On correct boundary value problems in the half space for partial differential equations with a right hand

PERIODICAL: Referativnyy zhurnal, Matematika, no. 5, 1961, 36, abstract 5B172. (Sibirsk. matem. zh., 1960, 1, no1, 45 - 61)

TEXT: The results of the preceding paper of the authors (Ref. 5B171) are generalised to the equation with right hand

$$\frac{\partial^m u}{\partial t^m} - \sum_{k=1}^{m-1} P_k\left(i\frac{\partial}{\partial x_1},\ldots,i\frac{\partial}{\partial x_n}\right)\frac{\partial^k u}{\partial x^k} = f(x,t) \qquad (1)$$

and on a system of equations with right hands and first derivatives with respect to t. Results for (1): As in the preceding paper there are considered solutions which belong to H for every $t \geq 0$ and satisfy the condition $u = O(t^r)$ for $t \to \infty$.

Lets: $u_k(x) = \partial^k u(x,0)/\partial t^k$ $(k \leq m-1)$, $v_k(\sigma)$ the Fourier

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transform of $u_k(x)$. Let $\lambda_0(\sigma),\ldots,\lambda_{m-1}(\sigma)$ the roots of the characteristic equation $\lambda^m - \sum_{k=0}^{m-1} P_k(\sigma)\lambda^k = 0$, where $\mathrm{Re}\lambda_{i+1} \geqslant \mathrm{Re}\lambda_i$ $(i=0,\ldots,m-2)$ and $\mathrm{Re}\lambda_{r-1}(\sigma) \leqslant 0 < \mathrm{Re}\lambda_r(\sigma)$. $W(\lambda)$ be the Vandermonde determinant with respect to $\lambda_0,\ldots,\lambda_{m-1}$; W_{jk} be the minor, obtained by striking out the jth column and the kth row; $Q_{jk} = W_{jk}/W_{j,m-1}$. Obviously Q_{jk} is a polynomial in $\lambda_0,\ldots,\lambda_{m-1}$. One supposes that $f(x,t)$ belongs to the same space, mentioned above, where $u(x,t)$ is searched. It follows especially that for the Fourier transform $g(x,t)$ of $f(x,t)$ there exist the integrals $\int_0^\infty e^{-\theta\lambda_r(\sigma)}\theta^k g(\sigma,\theta + t)d\theta$ $(k = 0,1,\ldots,m - 2)$.

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It is demanded that these integrals belong to the dual space to H and that they do not increase faster than a power of t.

Theorem: For the existence and uniqueness of the solution $u(x,t)$ of (1) with the initial functions $u_0(x),\ldots,u_{m-1}(x)$ it is necessary and sufficient that for $s \gg r$

$$\sum_{k=0}^{m+1}(-1)^{k+m+1}v_k(\sigma)Q_{sk} + \int_0^{\infty} g(\sigma,\theta)e^{-\theta\lambda_s(\sigma)}d\theta \equiv 0. \qquad (2)$$

The solution thus obtained depends continuously on the initial functions and on $f(x,t)$ with respect to the topology of the dual space to H. During the construction of the solution it is stated that the first r initial functions $v_0(\sigma),\ldots,v_{r-1}(\sigma)$, can be chosen arbitrarily (in the dual space to H) while the others $v_r(\sigma),\ldots,v_{m-1}(\sigma)$ are uniquely found out of (2). At the end of the paper some examples are given. It is shown that the conditions $u, f = O(t^r)$ can be replaced by $u, f = O(t^q e^{ct})$ with fixed c; there $r = r(\sigma)$ must be found out of the condition $\mathrm{Re}\,\lambda_{r-1}(\sigma) \leqslant c < \mathrm{Re}\,\lambda_r(\sigma)$.

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B112/B218

16.3500

AUTHOR: Shilov, G. Ye.

TITLE: Boundary problems in the quadrant for partial differential equations with constant coefficients

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 2, no. 1, 1961, 144-160

TEXT: The author studies a generalization of the following classical exact boundary problem with the aid of generalized functions:

$$\frac{\partial^m u}{\partial t^m} = \sum_{k=o}^{m-1} P_k\left(i \frac{\partial}{\partial x}\right) \frac{\partial^k u}{\partial tk} \qquad (t \geqslant 0,\ x \geqslant 0) \qquad (1).$$

Here, P_k are polynomials of p-th degree with constant coefficient. The corresponding boundary and initial conditions are:

$$w_o(t) = u(0,t),\ w_1(t) = \partial u(0,t)/\partial x,\ \ldots,\ w_{p-1}(t) = \partial^{p-1} u(0,t)/\partial x^{p-1} \qquad (2) \text{ and}$$

$$u_o(x) = u(x,0),\ u_1(x) = \partial u(x,0)/\partial t,\ \ldots,\ u_{p-1}(x) = \partial^{p-1} u(x,0)/\partial t^{p-1} \qquad (3).$$

The derivatives are transferred as follows:

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Boundary problems ...

$$\left.\begin{aligned} f' &= f_1' + h_0\delta(x), \\ f'' &= f_1'' + h_1\delta(x) + h_0\delta'(x), \\ &\ldots\ldots\ldots\ldots\ldots\ldots \\ f^{(p)} &= f_1^{(p)} + h_{p-1}\delta(x) + \ldots + h_1\delta^{(p-2)}(x) + h_0\delta^{(p-1)}(x). \end{aligned}\right\}$$

f', f'', ..., $f^{(p)}$ are the derivatives in the sense of the generalized functions; f_1', f_1'', ..., $f_1^{(p)}$ are the usual derivatives; h_0, h_1, ..., h_{p-1} are the discontinuities of f, f', ..., $f^{(p-1)}$ at the point $x = 0$. Eq. (1) may be transferred in the following manner:

$$\frac{\partial^m u}{\partial t^m} = \sum_{k=0}^{m-1} P_k\left(i\frac{\partial}{\partial x}\right)\frac{\partial^k u}{\partial t^k} = \sum_{j=0}^{p} Q_j\left(\frac{\partial}{\partial t}\right)\frac{\partial^j u}{\partial x^j}$$

$$= \sum_{j=0}^{p} Q_j\left(\frac{\partial}{\partial t}\right)\left[\frac{\partial^j u}{\partial x^j} - w_{j-1}(t)\delta(x) - \ldots - w_0(t)\delta^{(j-1)}(x)\right].$$

Here, the operator $\frac{\partial}{\partial x}$ in the last term is to be understood in the sense of generalized

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functions. The author defines: $g(s,t)$

$$=\sum_{j=0}^{p} Q_j\left(\frac{\partial}{\partial t}\right)\left[w_{j-1}(t) - isw_{j-2}(t) + (-is)^2 w_{j-3}(t) + \ldots + (-is)^{j-1} w_0(t)\right]$$

and proves that for a unique solvability of the boundary problems (1), (2), (3) in a certain class of generalized functions it is necessary and sufficient that the functions:

$$G_\nu(s) = \int_0^\infty e^{-\vartheta\lambda_\nu(s)} g(s,\vartheta)d\vartheta \quad (\nu = r, \ldots, m-1),$$ which are defined originally in the domain $\mathrm{Re}\,\lambda_\nu(s) > 0$, $\mathrm{Im}\,s > \beta$, be capable of an analytic continuation in the entire semi-plane $\mathrm{Im}\,s > \beta$. $\lambda_i(s)$ are the roots of the equation

$$\lambda^m = \sum_{k=0}^{m-1} P_k(s)\lambda^k.$$

As examples, the author considers an equation of first order, an equation of second order, and an equation that is totally exact with respect to $\frac{\partial}{\partial x}$ in the sense of Petrovskiy. Similar problems have been dealt with by S. L. Sobolev. There are 4 Soviet-bloc references.

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

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Correct boundary vlaue problems for partial differential equations in a semispace. Izv.AN SSSR Ser.mat. 24 no.3:369-380 My-Je '61. (MIRA 14:4)

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(Differential equations, Partial)

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SHILOV, G. Ye.

Relation between the fundamental function and the fundamental solution of Cauchy's problem. Izv. vys. ucheb. zav.; mat. no.2:160-167 '61. (MIRA 14:3)

1. Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova. (Polynomials) (Differential equations, Partial)

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SHILOV, Georgiy Yevgen'yevich; KOPYLOVA, A.N., red.; YERMAKOVA, Ye.A., tekhn. red.

[Mathematical analysis; special course] Matematicheskii analiz; spetsial'nyi kurs. Izd.2., Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1961. 436 p. (MIRA 14:12)
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SHILOV, G.Ye.

Theory of Fourier transformations of infinitely differentiable rapidly decreasing functions. Izv. vys. ucheb. zav.; mat no.3: 174-176 '61. (MIRA 14:7)

(Fourier's series)
(Functional analysis)

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Analog of one theorem of Loran Schwartz. Izv. vys. ucheb. zav.; mat. no.4:137-147 '61. (MIRA 14:7)
1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Spaces, Generalized)

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SHILOV, G. Ye.

Boundary value problems in a quarter of a plane for partial differential equations with constant coefficients. Sib. mat. zhur. 2 no.1:144-160 Ja-F '61. (MIRA 14:6)
(Boundary value problems)

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SHILOV, G. Ye.

"Volume and integral" by W. W. Rogosinski. Zhur. vych. mat. i mat. fiz. 2 no.5:955-956 S-O '62. (MIRA 16:1)

(Integrals)
(Rogosinski, W. W.)

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L 13001-63 EWT(d)/FCC(w)/BDS AFFTC IJP(C)

ACCESSION NR: AP3001418 S/0042/63/018/002/0099/0120

AUTHOR: Shilov, G. Ye.

16 51

TITLE: Integration in infinite-dimensional spaces and the Wiener integral

SOURCE: Uspekhi matematicheskikh nauk, v. 18, no. 2, 1963, 99-120

TOPIC TAGS: infinite-dimensional integration, Wiener integral, Daniell's method

ABSTRACT: In this expository article the author develops the theory of integration in infinite-dimensional spaces based on the method of Daniell rather than that of Lebesgue. He develops the Wiener integral and shows that the set of essentially continuous functions has Wiener measure zero. He also develops the Wiener integral as a limit of integral sums as well as of multiple integrals. He discusses the latter type of limit in general, pointing out that it need not be countably additive and therefore must be used with caution.

Section titles:

1. Daniell's scheme
2. Integration on an infinite-dimensional manifold
3. Reduction of an infinite-dimensional quasi-volume to a sequence of finite-dimensional ones.
4. The Wiener integral

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ACCESSION NR: AP3001418

5. Essentially continuous functions
6. The Wiener integral as limit of integral sums
7. The Wiener integral as limit of multiple integrals
8. Limit of multiple integrals per se

Orig. art. has 19 formulas and 1 figure.

ASSOCIATION: none

SUBMITTED: 17Dec62 DATE ACQ: 27May63 ENCL: 00

SUB CODE: 00 NO REF SOV: 007 OTHER: 004

Card 2/2

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"APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001549420019-6

GEL'FAND, I.M.; SHILOV, G.Ye.

Categories of finite-dimensional spaces. Vest. Mosk. un. Ser. 1: Mat., mekh. 18 no.4:27-48 Jl-Ag '63. (MIRA 16:8)

1. Kafedra teorii funktsiy i funktsional'nogo analiza Moskovskogo universiteta.

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Jacques Hadamard and the establishment of functional analysis; address at the memorial meeting of the Moscow Mathematical Society on March 10, 1964.

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Izrail' Moiseevich Gel'fand, 1913- ; on his 50th birthday.
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(MIRA 17:10)

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For closer contact between science and industry. Prom.koop. 13 no.12:14-15 D '59. (Mira 13:4)

1. Direktor Nauchno-issledovatel'skogo tekhnokhimicheskogo instituta Rospromsoveta.
(Chemistry, Technical)

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High results in firing and physical exertion. Voen.vest. 42 no.5:109-111 My '62. (MIRA 15:11)
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SHILOV, I.A.; BATRAKOV, V.S., otvetstvennyy redaktor; LYUBECHANSKAYA, N.I., redaktor izdatel'stva; GOR'KOVAYA, Z.P., tekhnicheskiy redaktor

[Method of calculating production costs on collective cotton farms] Metodika ischisleniia sebestoimosti produktsii khlopkoseiushchikh kolkhozov. Tashkent, Izd-vo Akademii nauk UzSSR, 1955. 29 p.
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The decisions are made by the Institute... Mest.prom.i khud. promys. 3 no.12:4-5 D '62. (MIRA 16:2)

1. Direktor Nauchno-issledovatel'skogo tekhnokhimicheskogo instituta Gosudarstvennogo komiteta Soveta Ministrov RSFSR po delam mestnoy promyshlennosti i khudozhestvennykh promyslov.
(Research, Industrial) (Service industries)

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Change in arterial pressure following use of the nitroglycerin test. Kaz.med.zhur. 40 no.5:115-116 S-O '59. (MIRA 13:7)
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(Volga River valley--Rats) (Rats--Volga River valley)
(Ural River valley--Rats) (Rats--Ural River valley)

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1. Biologo-pochvennyy nauchno-issledovatel'skiy institut MGU im. M.V.Lomonosova.
(Water voles)

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"Practical work in vertebrate zoology" by P.V.Terent'ev. Reviewed by I.A.Shilov. Zool.zhur. 36 no.8:1270-1272 Ag '57. (MIRA 10:9)
(Zoology--Study and teaching) (Vertebrates) (Terent'ev, P.V.)

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(ZVENIGOROD--BIOLOGICAL RESEARCH)

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