On a Principle of the Existence of Bounded, Periodic and Almost-Periodic Solutions of a System of Ordinary Differential Equations SOV/20-123-2-6/50

let be valid the non-local theorems of existence and uniqueness. Let every solution $x(t)$, $t \in [T_1, T_2]$ of (1) satisfying the initial condition $x(T_1) \in \Gamma$, satisfy the condition $x(t) \neq x(T_1)$, $t \in (T_1, T_2]$. Then (1) has at least one solution $x^*(t)$ for which $x^*(T_2) = x^*(T_1) \in G$.

There are 12 references, 9 of which are Soviet, 1 American, and 2 Polish.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: June 9, 1958, by P.S.Aleksandrov, Academician

SUBMITTED: May 10, 1958

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KRASNOSEL'SKIY, M.A., red.; MOISEYEV, N.N.; SOLOMENTSEV, Ye.D., red.; SMIRNOVA, N.I., tekhn.red.

[Theory of surface waves; collection of translations] Teoriia poverkhnostnykh voln; sbornik perevodov. Pod red. M.A.Krasnosel'skogo i N.N.Moiseeva. Moskva, Izd-vo inostr.lit-ry, 1959. 366 p.

(Waves) (MIRA 12:11)

KRASNOSEL'SKIY, M.A.

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. P. 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.

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120(

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S/155/59/000/02/005/036

AUTHORS: Krasnosel'skiy, M.A., Mamedov, Ya.D.

TITLE: Remark on the Application of Differential and Integral Inequalities in the Question of the Correctness of the Cauchy Problem for Ordinary Differential Equations in Banach Spaces

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1959, No. 2, pp. 32-37

TEXT: The authors show that, with the aid of well known theorems on differential and integral inequalities (especially the lemma of Chaplygin), one can estimate in a very simple way the variations effected on the solution of the integro-differential equations, if the right sides or the initial conditions are subject to small perturbations.
Ye.A. Barbashin, M.I. Vishik, L.A. Lyusternik, M.G. Kreyn, A.I. Perov, and P.Ye. Sobolevskiy are mentioned.
There are 12 references: 10 Soviet, 1 American and 1 German.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

SUBMITTED: February 20, 1959

Card 1/1

32503

16.4600

S/044/61/000/011/026/049
C111/C444

AUTHORS: Krasnosel'skiy, M. A., Rutitskiy, Ya. B., Sultanov, R. M

TITLE: On a non-linear operator, operating in spaces of abstract functions

PERIODICAL: Referativnyy zhurnal, Matematika, no. 11, 1961, 73, abstract 11B397. (Izv. AN. Azerb. SSR. Ser. fiz.-matem. i tekhn. n., 1959, no. 3, 15-21)

TEXT: Investigated are certain properties of the operator

$$fu(t) = f(t,u(t)) \quad (1)$$

which transforms a subset of a certain Banach space B into another Banach space B_1. One assumes that the abstract function f(t,u) with values in B_1 is strongly measurable for every fixed $u \in B$, and that the operator f(t,u) is strongly continuous with respect to u for almost all $t \in \Omega$; Ω is a bounded closed set of the finite dimensional Euclidian space. In the article it is proved that the theorems on the continuity and boundedness of the operator f which formerly have been proved for the spaces L^p, $L^p_{(u)}$ of vector functions, for Orlicz spaces

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etc., hold for broad classes of abstract function spaces. The concept of a "$\varkappa$ - space" is introduced as follows: Let $\check{B}$ be the linear subset of all measurable abstract functions u(t) with values in the Banach space B; let $\check{B}$ be made a complete Banach space by aid of a certain norm $\| \ \|_{\check{B}}$. The space $\check{B}$ is called "$\varkappa$ - space", if the following conditions are satisfied:

1.) There is $\| u \|_{\check{B}} = 0$ if and only if $u(t) = 0$ almost everywhere on Ω;

2.) $\check{B}$ contains all functions taking a constant value on Ω;

3.) $\check{B}$ contains together with the abstract function u(t) all functions $u(t) \varkappa_E(t)$, $\varkappa_E(t)$ being the characteristic function of the measurable set $E \subset \Omega$; there $\| u \varkappa_E \|_{\check{B}} \leq \| u \|_{\check{B}}$;

4.) Out of the condition $\|u\|_{\check{B}} \to 0$ there follows that the functions $u_n(t)$ converge to θ with respect to the norm.

The authors investigate certain properties of the introduced $\varkappa$ - space under certain additional conditions and prove the continuity of the

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operator f, transforming a subset of $\check{B}$ into $\check{B}^o$, where $\check{B}^o$ is the set of those functions of $\check{B}$ which have absolutely continuous norms. It is said that an abstract function $u(t) \in \check{B}$ possesses an absolutely continuous norm, if $\| u \varkappa_E \|_{\check{B}} \to 0$ for mes $E \to 0$. Further on it is proved that the operator f is bounded in every sphere $T_s \subset \check{B}_o$. At the end of the paper the case mes $\Omega = \infty$ is considered.

[Abstracter's note: Complete translation.]

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16(1) 05256

AUTHORS: Krasnosel'skiy, M.A., and Ladyzhenskiy, L.A. SOV/140-59-5-12/25

TITLE: On the Extent of the Notion u_o-Concave Operator

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1959, Nr 5, pp 112-121 (USSR)

ABSTRACT: The authors consider

$$(1) \qquad A\varphi(x) = \int_F G\left[x, y, \varphi(y)\right] dy \; .$$

An operator A in the Banach space E which is partially ordered with the aid of a cone K, is called u_o-concave if it is positive and monotone and if there exists a positive element u_o so that:

1) For every $\varphi \in K (\|\varphi\| \neq 0)$ there exist α, β, so that
(2) $\alpha u_o \leq A\varphi \leq \beta u_o$.

2) For every $\varphi \in K$ for which $\varphi \geq \gamma u_o$ $(\gamma > 0)$, and arbitrary $0 < a < b < 1$ there exists an η so that:
(3) $A(t\varphi) \geq (1+\eta) t A\varphi$ $(a \leq t \leq b)$
(the sign $\leq$ is also used for marking the ordering relations).
In the present paper the authors give conditions for the u_o-concavity, e.g.: For an increasing u let G(x,y,u) be increasing,

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$G(x,y,0) \equiv 0$. Let $H(x,y,u) = \frac{1}{u} G(x,y,u)$; $u_o = u_o(x) \equiv 1$.

Theorem 1: Let the operator (1) act in the space C of functions continuous on a bounded, closed set F of the Euclidean space. Let H(x,y,u) be not increasing with respect to u and

(4) $H(x,y,u_1) - H(x,y,u_2) > 0$

for almost all $y \in F$. Then (1) is u_o-concave in C with respect to the cone of all non-negative functions.

The authors formulate 8 theorems. They mention P.S.Uryson, I.A. Bakhtin, and Ya.D.Mamedov.

There are 8 Soviet references.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

SUBMITTED: February 10, 1959

3

16(1)

AUTHORS: Krasnosel'skiy, M.A., Perov, A.I. SOV/20-126-1-3/62

TITLE: On the Existence of Solutions for Some Non-Linear Operator Equations (O sushchestvovanii resheniy u nekotorykh nelineynykh operatornykh uravneniy)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 15 - 18 (USSR)

ABSTRACT: Let (f,y) denote the value of the linear functional $f \in E_y^*$ on the element $y \in E_y$; let E_x and E_y be Banach spaces.
Theorem : Let the non-linear operator T(x) be continuously differentiable according to Fréchet ; let

$$(Bh, T'(x)h) \geqslant \frac{1}{L(\|x\|)} \|h\|^2 \quad (x, h \in E_x) ,$$

where B is a linear continuous and continuously reversible operator from E_x into E_y^* , while the continuous positive function L(u) is of Osgood type: $\int^{\infty} \frac{du}{L(u)} = \infty$. Then the

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On the Existence of Solutions for Some Non-Linear Operator Equations SOV/20-126-1-3/62

equation $T(x) = y$ possesses a unique solution in E_x for every $y \in E_y$.

Let H_1, $H_2 \subset H$, H Hilbert space; let $\Theta(H_1,H_2) =$

$$= \max\left\{ \sup_{x \in H_1, \|x\|=1} \varrho(x,H_2) \; ; \sup_{x \in H_2, \|x\|=1} \varrho(x,H_1) \right\}.$$

Let A and B be bounded self-adjoint operators ; $H^-(A)$ and $H^-(B)$ be the invariant subspaces of A and B corresponding to the negative parts of the spectra.

Theorem: Let the Gateaux derivative $T'(x)$ of the operator $T(x)$ be a self-adjoint operator for every $x \in H$. Let $A \leqslant T'(x) \leqslant B$ $(x \in H)$, where A and B are self-adjoint, A^{-1} and B^{-1} continuous, $\Theta[H^-(A), H^-(B)] < 1$ and $((A-B)x,x) \leqslant 0$ for $x \in H$. Then $T(x) = y$ possesses a unique solution in H for every $y \in H$.

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On the Existence of Solutions for Some Non-Linear Operator Equations SOV/20-126-1-3/62

Then it is proved that the theorem of Kneser-Hukuhara concerning the integral cone is applicable to different classes of integro-differential equations and ordinary differential equations in Banach spaces.
Finally the case is considered where T'(x) does not possess a continuous inverse operator for all x. S.L. Sobolev is mentioned by the authors.
There are 15 references, 13 of which are Soviet, 1 German, and 1 Japanese.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: January 16, 1959, by P.S. Aleksandrov, Academician
SUBMITTED: January 13, 1959

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120(

~~16(1)~~ 16.4600 66442

AUTHORS: Krasnosel'skiy, M.A., and Sobolevskiy, P.Ye. SOV/20-129-3-7/70

TITLE: Fractional Powers of Operators Acting in Banach Spaces

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 3, pp 499-502 (USSR)

ABSTRACT: An operator A in the complex Banach space E is called normally positive if D(A) is dense in E and if for all $t \geqslant 0$ there exist the bounded operators $(A+tI)^{-1}$ defined in the whole E, where

(1) $\|(A+tI)^{-1}\| \leqslant \frac{C}{1+t}$ $(t \geqslant 0)$.

Let the operators $A^{-\alpha}$ $(\alpha \geqslant 0)$ be defined by $A^0 = I$ and

(2) $A^{-\alpha} = \frac{\sin \pi\alpha}{\alpha} \cdot \frac{n!}{(1-\alpha)(2-\alpha)\ldots(n-\alpha)} \int_0^\infty t^{n-\alpha}(A+tI)^{-n-1}\, dt,$

where $n > \alpha - 1$.

Theorem 1: Let A be normally positive. Then the $A^{-\alpha}$ form a strongly continuous semigroup of bounded operators.

Theorem 2: From $A^{-\alpha}x = 0$ for $\alpha \geqslant 0$ there follows $x = 0$. The sets of

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Fractional Powers of Operators Acting in Banach Spaces SOV/20-129-3-7/70

values $R(A^{-\alpha})$ of the $A^{-\alpha}$ are dense in E. For $\alpha > \beta \geq 0$ it holds $R(A^{-\alpha}) \subset R(A^{-\beta})$.

Theorem 3: Let $0 < \alpha < \beta$. Let A_1 be defined on $D(A^{\beta})$ by $A_1 x = A^{\alpha} x$. Then A^{α} is the closure of A_1.

Theorem 4: Let A be normally positive. Let $|\alpha| \leq |\beta|$, let α and β have the same sign. Then

$$(6) \quad \|A^{\alpha}x\| \leqslant K(\alpha, \beta) \|A^{\beta}x\|^{\alpha/\beta} \|x\|^{1-\alpha/\beta} \qquad (x \in D(A^{\beta})),$$

where K depends only on α, β and C of (1).

Three further theorems treat the comparison of several fractional operators. The authors mention M.Z.Solomyak, and S.G.Kreyn. There are 14 references, 13 of which are Soviet, and 1 German.

PRESENTED: July 9, 1959, by S.L.Sobolev, Academician

SUBMITTED: July 8, 1959

Card 2/2

12

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C111/C222

AUTHOR: Krasnosel'skiy, M.A.

TITLE: Solution of Equations Involving Adjoint Operators by Successive Approximations

PERIODICAL: Uspekhi matematicheskikh nauk, 1960, Vol.15, No.3, pp.161-165

TEXT: Theorem 1: Let A be a selfadjoint (in general not completely continuous) operator in the Hilbert space H, where $\|A\| \leq 1$ and -1 is no eigenvalue of A. Let the equation

(1) $\varphi = A\varphi + f$

have a (in general not unique) solution for a given f. Then the successive approximations

(2) $\varphi_n = A\varphi_{n-1} + f \quad (n=1,2,\dots)$

converge to the solution (if it is not unique, then to one of the solutions) of (1) for an arbitrary initial approximation $\varphi_0 \in H$.

Lemma 1: Every equation having a solution, with a linear continuous operator in the Hilbert space can be reduced to an equation of the type (1), where A satisfies the conditions of theorem 1.

Theorem 2: For every equation having a solution, with a linear bounded

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operator in the Hilbert space, a successive approximation can be made which converges to the solution.

Lemma 2: Let the assumptions of theorem 1 be satisfied. Let the continuous operator T of H into the Banach space E commutate with A. Then the successive approximations

(16) $\psi_n = A\psi_{n-1} + Tf \quad (n=1,2,\dots)$

converge with respect to the norm of E to the solution of

(17) $\psi = A\psi + Tf$

for every initial approximation $\psi_o = T\varphi_o$.

Theorem 3: Let the equation

(18) $\varphi = D\varphi + f$,

where D is a selfadjoint operator, be solvable in H; let a power D^n of D be a continuous operator of H into E. Then successive approximations can be constructed for the approximate solution of (18), which converge to the norm of E.

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From theorem 3 it is concluded: If a Fredholm equation of second kind with a kernel of potential type has a solution, then successive approximations can be constructed which, with arbitrarily many derivatives, converge to the solution.

The author mentions I.P.Natanson, S.G.Kreyn, B.M.Fridman, G.N.Polozhiy and S.L.Sobolev. There are 4 Soviet references.

SUBMITTED: December 1, 1959

Card 3/3

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C111/C333

AUTHORS: Krasnosel'skiy, M. A. Chechik, V. A.

TITLE: On a theorem of L. V. Kantorovich

PERIODICAL: Referativnyy zhurnal. Matematika, no. 12, 1961, 79, abstract 12B367. ("Tr. Seminara po funkts. analizu. Rostovsk.-n/D. un-t, Voronezhsk. un-t", 1960, vyp. 3-4, 50-53)

TEXT: The authors consider the equation $Kx \equiv x - \lambda Hx = y$, where x,y -- elements of the linear normal space X, H -- linear operator in X; it is assumed that X is mapped onto itself by K. Let X' be a complete subspace of X, φ a linear operator projecting X onto X'. Besides the initial equation there is considered the "adjecent" equation $\bar{K}x \equiv x - \lambda \bar{H}x = \varphi(y)$, where $\bar{H}$ is a linear operator in X'. It is assumed that $\| \varphi Hx' - \bar{H}x' \| < \varepsilon \| x' \|$ $(x' \in X')$ and that there is an $x' \in X'$ to every $x \in X$ such that $\| Hx - x' \| \leq \varepsilon_1 \| x \|$ ("proximity" conditions). With the aid of the general theory of deficiencies of linear operators in normed spaces it is proved that if K is invertible under the stated assumptions, and if $r = |\lambda| \, \| K^{-1} \| \, (\| \varphi \| \varepsilon_1 + \varepsilon_1 + \varepsilon) < 1$,

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On a theorem of L. V. Kantorovich

the equation $\tilde{K}x = \varphi(y)$ has a unique solution x for every y, where

$\|x\| \leq \frac{\|K^{-1}\|}{1-r} \|\varphi(y)\|$. It is mentioned that this result is analogous but not equivalent to a result of L. V. Kantorovich (Uspekhi matem. nauk, 1948, 3, vyp. 6, 108).

[Abstracter's note: Complete translation.]

4

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S/020/60/131/02/007/071

AUTHOR: Krasnosel'skiy, M.A.

TITLE: On a Theorem Stated by M.Riesz 16

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 131, Nr 2, pp 246-248 (USSR)

ABSTRACT: Let A be a linear operator of L^{p_1} into L^{r_1} and simultaneously of L^{p_2} into L^{r_2}; $1 \leq p_1, r_1, p_2, r_2 \leq \infty$. Here L^s is the space of functions $\varphi(x)$ summable in the power s on a bounded closed set G of a finite-dimensional space; the norm is $\|\varphi\|_s = \left\{\int_G |\varphi(x)|^s dx\right\}^{1/s}$. The numbers p and r are defined by

(1) $$\frac{1}{p} = \frac{t}{p_1} + \frac{1-t}{p_2}, \quad \frac{1}{r} = \frac{t}{r_1} + \frac{1-t}{r_2}$$

where t is an arbitrary fixed number of (0,1).

Theorem 1: Let r_1 be finite. Let A as an operator of L^{p_1} into L^{r_1} be completely continuous and as an operator of L^{p_2} into L^{r_2} be continuous. Then A is a completely continuous operator of L^p

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On a Theorem Stated by M.Riesz

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into L^r.

Theorem 2: Let A be completely continuous of L^{p_1} into C and continuous as an operator of L^{p_2} into L^{r_2}. Then A is a completely continuous operator of L^p, where p is given by (1), into L^r, where $r = \frac{r_2}{1-t}$.

The proofs are given for the case $G = [0,1]$. The theorems admit a generalization to sets G with an infinite measure.

The author mentions L.V.Kantorovich. He thanks S.G.Kreyn and A.S.Shvarts for discussions.

There are 2 Soviet references.

PRESENTED: November 20, 1959, by S.L.Sobolev, Academician

SUBMITTED: November 18, 1959

Card 2/2

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86382

S/020/60/135/002/002/036
C111/C222

AUTHOR: Krasnosel'skiy, M.A.

TITLE: Regular and Perfectly Regular Cones

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 2, pp. 255-257

TEXT: The cone K in the real Banach space E is called regular if every sequence $x_n \in E$ for which it holds

(1) $$x_1 \leqslant x_2 \leqslant \dots \leqslant x_n \leqslant \dots$$

(2) $$x_n \leqslant z \quad (n = 1,2,\dots)$$

converges with respect to the norm to an element of E. K is perfectly regular if every sequence $x_n \in E$ which satisfies (1) and for which

(3) $$\|x_n\| \leqslant M \ (n = 1,2,\dots) \quad ,$$

converges with respect to the norm.

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Regular and Perfectly Regular Cones

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Theorem 1 : Every perfectly regular cone is regular.
K is called normal if there exists a $\delta > 0$ so that for arbitrary e, $g \in K$ from $\| e \| = \| g \| = 1$ it follows $\| e + g \| > \delta$.
Theorem 2 : Every regular cone is normal.
Let u be a fixed element of K different from zero. Let E_u denote the set of such $x \in E$ that for certain $a = a(x)$ it holds : $- a\, u \leq x \leq a\, u$. The smallest a for which this inequation is satisfied is called u-norm of a and is denoted with $\| x \|_u$.

Theorem 3 : In order that K is normal it is necessary and sufficient that an $M > 0$ exists so that for every $y \in K$ it holds :

(4) $$\| x \| \leq M \| y \| \cdot \| x \|_y \quad (x \in E_y) .$$

The positive functional f(x) defined on K is called strongly increasing if for all $h_n \in K$ $(n = 1,2,\ldots)$ from $\| h_n \| \geqslant \varepsilon_0 > 0$ $(n = 1,2,\ldots)$ it follows $\lim_{n \to \infty} f(h_1 + \cdots + h_n) = \infty$.

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Theorem 4 : Let a functional strongly increasing on K be bounded on the intersection of the cone with each sphere of E. Then K is perfectly regular.

Theorem 5 : If on K a monotone strongly increasing functional can be defined then K is perfectly regular.

A linear functional f(x) is called uniformly positive if it holds

(5) $$f(x) \geqslant a \, \| x \| \qquad (x \in K) \quad ,$$

where $a > 0$. It is said that K admits a coating if there exists a cone K_1 so that every $x \in K$ different from zero is an inner element of K_1 and furthermore it lies in K_1 with a spherical neighborhood of radius $b \| x \|$, where b does not depend on x .

Theorem 6 : In order that K admits a coating it is necessary and sufficient that on K a uniformly positive linear functional can be defined.

Theorem 7 : Every cone admitting a coating is perfectly regular.

Theorem 8 : On K let be defined a linear completely continuous (on K) operator A, where

(6) $$\| Ax \| \geq a \, \| x \| \qquad (x \in K) \; .$$

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Regular and Perfectly Regular Cones

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Then K admits the coating.
Theorem 9 relates to linear operators with respect to which a certain cone is invariant.
The author mentions M.G. Kreyn, V.Ya. Stetsenko, D.P. Mil'man and I.A. Bakhtin.
There are 4 Soviet references.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: June 15, 1960, by P.S. Aleksandrov, Academician

SUBMITTED: June 11, 1960

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S/020/60/135/003/005/039
C111/C222

AUTHOR: Krasnosel'skiy, M.A.

TITLE: Stationary Points of Cone - Compressing or Cone - Extending Operators

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 3, pp. 527-530

TEXT: Let K be a cone in the real Banach space E. Let $x \leqslant y$ if $y-x \in K$; let $x \leqslant y$ if $y-x \in K$.
Theorem 1: Let the operator A be completely continuous, let there exist an $R > 0$ so that

(1) $$Ax \not\geqslant x \quad (x \in K, \|x\| \geqslant R).$$

then A has at least one fixed point in K.
Furthermore let $A\theta = \theta$, where θ is the zero point of E.
Let A compress K if there exist positive R, r so that (1) and

(2) $$Ax \not\leqslant x \quad (x \in K, \|x\| \leqslant r)$$

is satisfied. Let A extend K if

(3) $$Ax \not\leqslant x \quad (x \in K, \|x\| \geqslant R)$$

and

(4) $$Ax \not\geqslant x \quad (x \in K, \|x\| \leqslant r).$$

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Stationary Points of Cone - Compressing or Cone - Extending Operators

Theorem 2: Let the completely continuous operator A extend or compress K. Then A has at least one fixed point different from zero in K.
The proofs of the theorems 1 and 2 are given with topological methods.
A linear operator B which leaves K fixed, is called u_o-bounded from below (above) if to every $x \in K$ there exist an integer $p = p(x)$ and a positive number $\alpha = \alpha(x)$ so that $B^p x \geqslant \alpha u_o$ ($B^p x \leqslant \alpha u_o$); here u_o is an element of K different from zero.
For an examination of the conditions of theorems 1,2 the author uses:
Theorem 3: Let the linear operator B u_o-bounded from below satisfy the condition $Bu_o \geqslant (1+\varepsilon_o)u_o$, $\varepsilon_o > 0$. Then it holds $Bx \not\leqslant x$ for all $x \in K$, $x \neq \theta$.
Theorem 4: Let the linear operator B u_o-bounded from above satisfy the condition $Bu_o \leqslant (1-\varepsilon_o)u_o$, $\varepsilon_o > 0$. Then $Bx \not\geqslant x$ for all $x \in K$, $x \neq \theta$.
Let $A'(\theta)$ and $A'(\infty)$ be linear operators so that

$$\lim_{x \in K, \|x\| \to 0} \frac{\|Ax - A\theta - A'(\theta)x\|}{\|x\|} = \lim_{x \in K, \|x\| \to \infty} \frac{\|Ax - A'(\infty)x\|}{\|x\|} = 0.$$

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S/020/60/135/003/005/039
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Stationary Points of Cone - Compressing or Cone - Extending Operators

Theorem 5: Let A be completely continuous. Let each of the operators $A'(\theta)$ and $A'(\infty)$ have a single eigenvector in K; let $\lambda(\theta)$ and $\lambda(\infty)$ be the corresponding eigenvalues. For the existence of a fixed point different from zero of A in K it suffices that $1 \in (\lambda(\theta), \lambda(\infty))$.
Theorems 6 and 7 relate to the case where E is weakly complete, the unit sphere is weakly compact in E and K admits a coating.
The application of the new theorems on fixed points to nonlinear integral equations or boundary value problems is made according to the usual schemes (cf.(Ref.2)). The given theorems can furthermore be used for the proof of periodic solutions of nonlinear differential equations. Three examples are considered, e.g.: Given the system

(9) $\ddot{x}_i = -f_i(x_1,\ldots,x_n;\ \dot{x}_1,\ldots,\dot{x}_n) \qquad (i=1,\ldots,n),$

where the left sides are odd either in the x or in the x and $\dot{x}$. For $x_j \geqslant 0$ and all y_k let

$$m^2(x_1+\ldots+x_n) \leqslant f_i(x_1,\ldots,x_n;\ y_1,\ldots,y_n) \leqslant m_1^2(x_1+\ldots+x_n)+M$$
$$(i=1,\ldots,n)$$

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Stationary Points of Cone - Compressing or Cone - Extending Operators

Let exist a $\delta_0 > 0$ so that for $0 < x_j < \delta_0, |y_k| < \delta_0$ it holds

$$f_i(x_1,\ldots,x_n;y_1,\ldots,y_n) \geqslant m_0^2(x_1+\ldots+x_n) \quad (i=1,\ldots,n).$$

From theorem 2 then it follows that (9) has periodic solutions different from zero with a continuum of different periods if $m_1 < m_0$.

There are 3 Soviet references.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: June 15, 1960, by P.S.Aleksandrov, Academician

SUBMITTED: June 10, 1960

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120(

KRASNOSELSKIY, M. A. and PEROV, A. I.

"On some features of the existence of periodic solutions for the systems of ordinary differential equations."

Paper presented at the Intl. Symposium on Nonlinear Vibrations, Kiev, USSR, 9-19 Sep 61

Voronezh State University, Voronezh, USSR

S/199/61/002/003/001/005
B112/B203

AUTHORS: Bakhtin, I. A., Krasnosel'skiy, M. A.

TITLE: Method of successive approximations in the theory of equations with concave operators

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 2, no. 3, 1961, 313 - 330

TEXT: The authors communicated the most important results of this study in an earlier paper (Ref. 1: K teorii uravneniy s vognutymi operatorami. Doklady Ak. nauk SSSR, 123, no. 1, (1958) 17 - 20) without giving a proof. The subject of the study are equations with operators transforming non-negative functions into non-negative functions. The authors consider a real Banach space E in which two cones, K and K_1, are distinguished where $K \subset K_1$. The relation $x \leqslant y$ means that $y - x$ is contained in K_1. The cone K_1 is regular if any monotonic and bounded sequence $x_n (x_1 \leqslant x_2 \leqslant \ldots \leqslant x_n \leqslant \ldots \leqslant z_0)$ converges with respect to its norm. By

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Method of successive approximations ... S/199/61/002/003/001/005 B112/B203

$K<v_0, w_0>$, the authors designate the set of all $x \in K$, for which $v_0 \leqslant x \leqslant w_0$ holds. A continuous operator A is monotonic on a set $T \subset E$, if the inequality $Ax \leqslant Ay$ results from $x \leqslant y$ $(x, y \in T)$. The operator A is concave on K if it is positive and monotonic, if for any element $x \in K$ differing from the zero element there are positive numbers α and β, so that $\alpha u_0 \leqslant Ax \leqslant \beta u_0$, and if for any element $x \in K$ satisfying the condition $x \geqslant \gamma u_0$ $(\gamma > 0)$ the relation $A(t, x) \geqslant tAx$, $Atx \neq tAx$ $(0 < t < 1)$ is fulfilled. Here, u_0 is a certain element of K differing from the zero element. A concave operator A is u_0-concave if for any $x \in K$ $(x \geqslant \gamma u_0, \gamma > 0)$ and for any interval $[a, b] \subset (0, 1)$ there is a number $\eta = \eta(x; a, b) > 0$, so that $A(tx) \geqslant (1 + \eta)tAx$. The authors prove the following theorems: (1) If an operator A monotonic on $K<v_0, w_0>$ transforms the set $K<v_0, w_0>$ in itself, then it is sufficient for the existence of a fixed point that one of the following three conditions is fulfilled: (a) the cone K is regular, (b) the operator A is fully continuous, (c) a non-decreasing, for $r > 0$ positive function $\alpha(r)$ exists so that $A(x + y) \geqslant Ax + \alpha(\|y\|)z_0$ $(x, x + y \in K<v_0, w_0>, y \in K)$, where

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z_0 is a certain element in K differing from the zero element. (2) If the conditions of theorem 1 are fulfilled, and if there is only one fixed point x*, then the latter is the limit element of the successive approximations $x_n = Ax_{n-1}$ $(n = 1, 2, ...)$, whatever element x_0 is the initial element of this approximation. (3) If the equation $x = Ax$ with the concave operator A on the cone K has a unique solution x* differing from the zero solution, and if one of the three conditions (a, b, c) of theorem 1 is fulfilled, then the sequence $x_n = Ax_{n-1}$ converges with respect to its norm, whatever point $x_0 \in K$ is the initial point of the approximation. (4) If the equation $x = Ax$ with the u_0-concave operator A in the cone K has a solution x* differing from the zero solution, then the sequence $x_n = Ax_{n-1}$ converges for all $x_0 \in K$ with respect to its u_0-norm toward x* (the u_0-norm of x is the smallest number ϱ for which the inequality $-\varrho u_0 \leqslant x \leqslant \varrho u_0$ is fulfilled). (5) If the operator A is concave, and if for any elements v and w $(v \geqslant \gamma_1 u_0, \gamma_1 > 0)$ differing from zero $Aw \geqslant t_0 Av + \varepsilon_0 u_0$ $(\varepsilon_0 = \varepsilon_0(v, w, t_0) > 0)$ follows from $t_0 v \leqslant w \leqslant v$ $(t_0 v \neq w, w \neq v)$,

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then the operator A^2 is u_0-concave. Theorem (6) expresses the monotony and concavity of an operator of particular structure. The authors present some applications of the theorems proven. They mention M. G. Kreyn and P. S. Uryson. There are 13 Soviet-bloc references.

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S/044/62/000/009/013/069
A060/A000

AUTHORS: Kibenko, A. V., Krasnosel'skiy, M. A., Mamedov, Ya. D.

TITLE: One-sided estimates for the existence conditions of solutions to differential equations in functional spaces

PERIODICAL: Referativnyy zhurnal, Matematika, no. 9, 1962, 36 - 37, abstract 9B193 ("Uch. zap. Azerb. un-t. Ser. fiz.-matem. i khim. n.", 1961, no. 3, 13 - 19 (Azerbayjanian))

TEXT: The sufficient conditions are formulated for the existence of a solution to the Cauchy problem

$$\frac{dx}{dt} = f(x,t), \quad x\big|_{t=o} = x_o \qquad (1)$$

in the Banach space E. Let $\Phi(x)$, $x \in E$, be a nonlinear continuous functional, where $\Phi(0) = 0$, $\Phi(x) > 0$ for $\|x\| > 0$, and from the condition that

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$\Phi(x) \to 0$ it follows that $\|x\| \to 0$. Let

$$\Phi(x+h) - \Phi(x) = D(x,h) + w(x,h),$$

where the functional $D(x,h)$ is continuous in h uniformly with respect to x in any sphere, semihomogeneous and semi-additive with respect to h, and

$$\lim_{\|h\| \to 0} \frac{w(x,h)}{\|h\|} = 0.$$

With S_0 we shall denote the sphere $\|x - x_0\| \leqslant r$. Let the operator $f(x,t)$ with values in E be uniformly continuous with respect to the set of variables $t \in [0,T]$ and $x \in S_0$, let this operator satisfy the condition

$$D(x - y, f(t,x)) - f(t,y) \leqslant L(t, \Phi(x - y)),$$

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One-sided estimates for the existence conditionsof... S/044/62/000/009/013/069 A060/A000

where the function L is continuous, and the Cauchy problem

$$\frac{du}{dt} = L(t,u),\ u(0) = 0$$

has a unique zero solution. Then the problem (1) has a solution. It is also proven that there is at least one solution to the Cauchy problem

$$\frac{du}{dt} = f(x,t) + h(x,t),\ x\big|_{t=0} = x_0, \qquad (2)$$

provided f satisfies the conditions enumerated above, and the operator h (x,t) is completely continuous. Some considerations are cited as to the existence of a solution to the Cauchy problem

$$\frac{dx}{dt} = A(t)x + f(t,x), x\big|_{t=0} = x_0,$$

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where A (t) is an unbounded linear operator. The convergence of the consecutive approximations for the problem (2) is investigated.

S. G. Mikhlin

[Abstracter's note: Complete translation]

Card 4/4

BAKEL'MAN, I.Ya.; KRASNOSEL'SKIY, M.A.

A criterion for the solvability of a two-point boundary problem [with summary in English]. Vest. LGU no.13:161-163 '61.
(MIRA 14:7)
(Differential equations)

21958

S/020/61/137/005/001/026
C111/C222

16.3800

AUTHORS: Bakel'man, I.Ya., and Krasnosel'skiy, M.A.

TITLE: Non-trivial solutions of the Dirichlet problem for equations with the operator of Monge-Ampère

PERIODICAL: Akademiya nauk SSSR. Doklady, vol.137, no.5, 1961, 1007-1010

TEXT: The authors investigate non-negative solutions of

$$rt-s^2 = f(x,y,z,p,q)(1+p^2+q^2)^{\alpha}, \quad (1)$$

$$z(x,y)|_{\Gamma} = 0, \quad (2)$$

where $0 \leqslant \alpha \leqslant 1$, Γ -- boundary of the bounded convex region Ω and it has a specific curvature bounded from below by a positive number; $f(x,y,z,p,q)$ is continuous for $\{x,y\} \in \bar{\Omega}$, $z \geqslant 0$, $-\infty < p, q < \infty$, non-negative and for a z of an arbitrary finite interval it is uniformly bounded from above in the other variables. Every convex function $z(x,y)$ generates by its support planes $z-z(x_0,y_0) = p(x-x_0)+q(y-y_0)$ the so-called normal mapping of the points $\{x_0,y_0\} \in \bar{\Omega}$ into the p,q-plane. A solution of (1)-(2) is a non-negative convex function with an absolutely continuous area of the normal derivation if it almost everywhere

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satisfies (1) and vanishes on Γ.
At first the authors consider

$$rt-s^2 = \varphi(x,y)(1+p^2+q^2)^{\alpha}, \quad z(x,y)\big|_{\Gamma} = 0. \qquad (3)$$

Let $z(x,y) = A_{\alpha}\varphi(x,y)$.
Theorem 1: A_{α} transforms every uniformly bounded family of non-negative functions into a set which is compact in the sense of the uniform convergence. The operator A_{α} transforms every uniformly bounded and point-by-point convergent sequence of functions into a uniformly convergent sequence.
Theorem 2: A. The A_{α} are monotone, i.e. from $0 \leq \varphi(x,y) \leq \psi(x,y)$ it follows $A_{\alpha}\varphi(x,y) \leq A_{\alpha}\psi(x,y)$.
B. For $0 \leq \alpha < 1$ for every non-negative $\varphi(x,y)$ it holds:

$$A_{\alpha}\left[\lambda\varphi(x,y)\right] \geq \lambda^{\frac{1}{2(1-\alpha)}} A_{\alpha}\varphi(x,y) \quad (0 \leq \lambda \leq 1). \qquad (4)$$

C. If $\alpha_1 < \alpha_2$ then for every non-negative $\varphi(x,y)$ it holds:

$$A_{\alpha_1}\varphi(x,y) \leq A_{\alpha_2}\varphi(x,y).$$

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Non-trivial solutions...

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D) It holds

$$0 \leq A_{\alpha}\varphi(x,y) \leq \begin{cases} r_0 \sqrt{\left[(1-\alpha)\|\varphi\| r_0^2+1\right]^{\frac{1}{1-\alpha}}-1}, & \text{if } 0 \leq \alpha < 1, \\ r_0 \sqrt{e^{\|\varphi\| r_0^2}} & \text{if } \alpha = 1; \end{cases}$$

$$p^2+q^2 \leq \begin{cases} \left[(1-\alpha)\|\varphi\| r_0^2+1\right]^{\frac{\alpha}{1-\alpha}}-1 & \text{if } 0 \leq \alpha < 1, \\ e^{\|\varphi\| r_0^2}-1 & \text{if } \alpha = 1, \end{cases}$$

where p and q are the slopes of an arbitrary support plane of $A_{\alpha}\varphi(x,y)$; $1/r_0$ is the lower bound of the specific curvature of Γ.

The authors consider the operator

$$B\varphi(x,y) = A_{\alpha} f\left[x,y,\varphi(x,y),\frac{\partial}{\partial x}\varphi(x,y),\frac{\partial}{\partial y}\varphi(x,y)\right]. \qquad (5)$$

Theorem 3: The operator B lets invariant the cone of the non-negative convex functions which satisfy (2), and it is completely continuous on

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this cone (in the sense of the uniform metric).
Theorem 4: Let

$$f(x,y,z,p,q) \leqslant \begin{cases} a_1(1+z^2)^{\gamma} & \text{for } 0 \leq \alpha \leq 1, \\ a_1 \ln^{1-\varepsilon}(2+z) & \text{for } \alpha = 1, \end{cases} \quad (6)$$

where $\gamma < 1-\alpha$, $\varepsilon > 0$, $a_1 > 0$. Then (1)-(2) has at least one solution.
Theorem 5: Let (6) be satisfied and let exist a $\delta_0 > 0$ so that

$$f(x,y,z,p,q) \geqslant a_2 z^{2-\varepsilon} \quad (0 \leqslant z \leq \delta_0; \ -\infty < p, \ q < \infty), \quad (7)$$

where $a_2 > 0$, $\varepsilon > 0$. Then (1)-(2) has at least one solution which does not vanish identically.
Theorem 6: Let $f(x,y,z)$ be non-decreasing in z; $f(x,y,z) > 0$ for $z > 0$ and almost all $\{x,y\} \in \Omega$. Let

$$f(x,y,\lambda z) \geqslant \lambda^{\gamma_0} f(x,y,z) \quad (\{x,y\} \in \Omega \ ; \ 0 \leqslant \lambda \leq 1; \ z \geqslant 0), \quad (9)$$

where $\gamma_0 < 2(1-\alpha)$. Then (1)-(2) cannot have more than one non-negative solution being not $\equiv 0$.

Theorem 7: Let exist $\delta_0 > 0$ and $M_0 > 0$ so that

$$f(x,y,z,p,q) \leq a_3 z^{\gamma_1} \quad (\{x,y\} \in \Omega \; ; \; 0 \leq z \leq \delta_0 ; \; -\infty < p, \; q < \infty); \qquad (10)$$

$$f(x,y,z,p,q) \geq a_4 z^{\gamma_1} \quad (\{x,y\} \in \Omega \; ; \; z \geq M_0 ; \; -\infty < p, \; q < \infty), \qquad (11)$$

where $\gamma_1 > 2$, $a_3, a_4 > 0$. Then (1)-(2) has at least one solution beside of the trivial one.

Theorem 8: Let exist a sequence $R_n \to \infty$, so that

$$f(x,y,z,p,q) \geq az^{\gamma_1} \quad (\delta R_n \leq z \leq R_n),$$

where $\gamma_1 > 2$ and $\delta > 0$ is sufficiently small. Let exist a sequence $R_n^* \to \infty$ so that

$$f(x,y,z,p,q) \leq a_n (1+z^2)^{\gamma_2} \quad (0 \leq z \leq R_n^*),$$

where $\gamma_2 < 1-\alpha$ and the a_n satisfy the condition

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$$r_0 \sqrt{\left[(1-\alpha)a_n(1+R_n^{*2})^{\gamma_2} r_0^2 + 1\right]^{\frac{1}{1-\alpha}} - 1} < R_n^* ,$$

where $1/r_0$ is the lower bound of the specific curvature of Γ. Then (1)-(2) has a countable set of different solutions z_n the maxima of which increase unboundedly for $n \to \infty$.

The theorems can be generalized to equations

$$\frac{rt-s^2}{(1+p^2+q^2)^\alpha} \geq E(x,y,z,p,q)r+2F(x,y,z,p,q)s + +G(x,y,z,p,q)t + f(x,y,z,p,q)$$

and

$$\frac{rt-s^2}{R(p,q)} = f(x,y,z,p,q),$$

where $R(p,q)$ is different from $(1+p^2+q^2)$ $(0 < \alpha \leq 1)$.

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Non-trivial solutions...

There are 6 Soviet-bloc references.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: November 23, 1960, by P.S.Aleksandrov, Academician

SUBMITTED: November 22, 1960

Card 7/7

ZABREYKO, P.P.; KRASNOSEL'SKIY, M.A.

Calculating the index of an isolated fixed point of a completely continuous vector field. Dokl. AN SSSR 141 no.2:292-295 N '61.
(MIRA 14:11)

1. Predstavleno akademikom P.S.Aleksandrovym.
(Vector analysis)

32299
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C111/C222

16.4100

AUTHORS: Krasnosel'skiy, M.A., and Rutitskiy, Ya.B.

TITLE: Some approximate methods of solving non-linear operator equations by linearization

PERIODICAL: Akademiya nauk SSSR. Doklady, v.141, no. 4, 1961, 785-788

TEXT: If $P(x)$ is a non-linear operator of the Banach space E into the Banachspace E_1, and if $P(x)$ in an open sphere $\Omega \subset E$ has the Frechet derivative $P'(x)$ then

$$P(x) = 0 \qquad (1)$$

can be solved approximately by taking the solutions of the linearized equation

$$P'(x_{n-1})(x - x_{n-1}) + P(x_{n-1}) = 0 \qquad (2)$$

as successive approximations x_n. This equation, however, mostly cannot be solved rigorously.
Let the approximate solution of the linear equation
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$$Bx = b \tag{3}$$

be carried out with any fixed method. The transition from the initial approximation x_0 to the "better" approximation x_1 defines a certain non-linear operator

$$x_1 = V(x_0 ; B, b) \quad . \tag{4}$$

Applying (4) successively for the solution of the linearized equation (2) then one obtains the iteration process

$$x_n = V(x_{n-1}; P'(x_{n-1}), P'(x_{n-1})x_{n-1} - P(x_{n-1})) \, . \tag{5}$$

In the present paper the authors investigate the convergence of (5). It is assumed that on Ω the Hölder condition $\|P'(x_1) - P'(x_2)\| \leq k\|x_1 - x_2\|^{\alpha}$ $(0 < \alpha < 1)$ is satisfied and that for all $x_0 \in \Omega$ the approximate solution $V(x_0) = V(x_0 ; P'(x_0), P'(x_0)x_0 - P(x_0))$ and the rigorous solution $\tilde{x}$ of the linear equation

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$$P'(x_0)x = P'(x_0)x_0 - P(x_0)$$

are connected by the relation

$$\|V(x_0) - \tilde{x}\| \leq q\|x_0 - \tilde{x}\| \qquad (11)$$

with $0 < q < 1$.

Theorem 1 : Let the initial approximation x_0 satisfy the conditions :

1) There exists $\Gamma_0 = [P'(x_0)]^{-1}$ and $\|\Gamma_0\| \leq B_0$.

2) $\|\Gamma_0 P(x_0)\| \leq \eta_0$.

3) It holds

$$h_0 = B_0 k \eta_0^{\alpha} \leq \frac{\beta(q)}{(1+q)^{\alpha}}, \qquad (12)$$

where $\beta(q)$ is the root of

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$$\frac{1}{(1-\beta)^{1+\alpha}}\left(q+\frac{\beta(1+q)}{1+\alpha}\right)^{\alpha}=1 \qquad (13)$$

4) The sphere S_o : $\|x-x_o\| \leqslant \frac{1+q}{1-\gamma}\eta_o$, where $\gamma=(1-\beta(q))^{1/\alpha}$, is contained in Ω .

Then in S_o there lies a solution x^* of (1) to which the successive approximations (5) are converging. If (12) is a rigorous inequality then it holds

$$\|x_n - x^*\| \leqslant (q+\varepsilon_n)\|x_{n-1}-x^*\|$$

where $\varepsilon_n \to 0$.

If $\Gamma(x)$ does not only exist in x_o but in a certain neighborhood S of x_o and if $\|\Gamma(x)\| \leqslant B (x \in S)$ then the conditions of theorem 1 can be weakened. Let $h_o = Bk\eta_o^{\alpha}$, $d_o = \frac{1+q^{1+\alpha}}{1+\alpha}h_o + q$ and furthermore :

$\eta_n = d_{n-1}\eta_{n-1}$, $h_n = Bk\eta_n^{\alpha}$, $d_n = \frac{1 + q^{1+\alpha}}{1 + \alpha} \cdot h_n + q$. Let $d_o < 1$ and D be the sum of $1 + d_o + d_o d_1 + d_o d_1 d_2 + \dots$.

Theorem 2 : Let

$$h_o = Bk\eta_o^{\alpha} < \frac{1 - q}{1 + q^{1+\alpha}}(1 + \alpha) \qquad (14)$$

Let the sphere S_o : $\|x - x_o\| \leq (1 + q) D\eta_o$ lie in S. Then in S_o there exists a solution x^* of (1) to which (5) is converging. Reducing the solution of (1) in every step to the solution of

$$P'(x_o)(x - x_{n-1}) + P(x_{n-1}) = 0$$

and using V then one obtains the method

$$x_n = V(x_{n-1}; P'(x_o), P'(x_o)x_{n-1} - P(x_{n-1})) . \qquad (15)$$

Theorem 3 : Under the assumptions of theorem 1 let

$$h_o = B_o k \eta_o^{\alpha} < \frac{(1 - q)^{1+\alpha}}{1 + q} \left(\frac{\alpha}{1 + \alpha}\right)^{\alpha} .$$

Let the sphere S_o : $\|x - x_o\| \leq N \eta_o$, where N is the smallest root of

$$\frac{1 + q}{1 + \alpha} h_o N^{1+\alpha} - (1 - q)N + 1 = 0$$

lie in Ω . Then the successive approximations (15) converge to the solution x^* of (1). It holds

$$\|x_n - x^*\| \leq q_1 \|x_{n-1} - x^*\|$$

where $q_1 = (1+q)h_o N^{\alpha} + q$.

Theorem 4 : Let the successive approximations of the solution x^* of (1) be determined according to the formulas

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$$x_n = V(x_{n-1};\ P'(x_0),\ P'(x_0)x_{n-1} - P(x_{n-1})) + h_n \quad , \qquad (16)$$

where h_n -- random vector, $\| h_n \| < \delta$ $(n=1,2,\ldots)$. Let

$$h_0 = B_0 k \eta_0^{\alpha} < \frac{(1-q)^{1+\alpha}}{1+q} \cdot \frac{\left(\frac{\alpha}{1+\alpha}\right)^{\alpha}}{(1+\delta)^{\alpha}} \ .$$

Let the condition (11) be satisfied in the sphere $\| x-x_0 \| < N_1 \eta_0$, where N_1 is the smallest root of

$$\frac{1+q}{1+\alpha} h_0 N^{1+\alpha} - (1-q)N + 1 + \delta = 0 \ .$$

Then for the successive approximations (16) there holds the relation

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Some approximate methods of solving ...

$$\overline{\lim_{n\to\infty}} \| x_n - x^* \| \leq \frac{\overline{\lim\limits_{n\to\infty}} \| h_n \|}{1 - q_1}$$

where $q_1 = (1 + q)h_o N^{\alpha} + q$.

The authors mention Kantorovich, S.G. Kreyn, V.M. Fridman, B.A. Vertgeym and I.P. Mysovskikh. There are 6 Soviet-bloc references.

PRESENTED: July 13, 1961, by I.N. Vekua, Academician

SUBMITTED: July 12, 1961

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APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00082612O(

KRASNOSEL'SKIY, M. A.; LYUBARSKIY, G. Ya.

Transitional solutions to nonlinear equations. Izv. vys. ucheb. zav.; mat. no.4:81-85 '62. (MIRA 15:10)

1. Voronezhskiy gosudarstvennyy universitet i Ukrainskiy fiziko-tekhnicheskiy institut AN UkrSSR.

(Differential equations)

16.6900

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S/208/62/002/005/007/009
B112/B102

AUTHORS: ~~Krasnosel'skiy, M. A.,~~ Levin, A. Yu. (Voronezh)

TITLE: Stabilization of solutions to optimum problems

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 2, no. 5, 1962, 915-921

TEXT: A sequence of numbers $c_1, c_2, \ldots$ is said to be stabilized with respect to a given sequence of problems Z_1, $Z_2, \ldots$ if, for each n, the numbers $c_1, c_2, \ldots, c_n$ form a vector solution of the problem Z_n. Various types of problems are considered on lines similar to dynamical programming. One of them is the following: A set of continuous functions $x_{ij}(t)$ ($i = 1,2,\ldots,l$; $j = 1,2,\ldots$) fulfills the conditions $x_{ij}(0) = 0$, $x_{ij}(t) \equiv 0$ or $x_{ij}(t) > 0$ for $t > 0$, $\sum_{i=1}^{l} x_{ij}(t) > 0$ for $t > 0$. A sequence of functions $x_i(t)$ satisfies the inequalities $x_i(t) < \max\{x_i(t_1), x_i(t_2)\}$ for

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APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120(

S/208/62/002/005/007/009
B112/B102

Stabilization of solutions to...

$t_1 < t < t_2$. The problem X_n is to find n numbers $t_1 \geqslant 0, \ldots, t_n \geqslant 0$ which maximize the expression

$$S_n(t_1, t_2, \ldots, t_n) = x_1(t_1) + x_2(t_2) + \ldots + x_n(t_n)$$

under the conditions

$$x_{11}(t_1) + x_{12}(t_2) + \ldots + x_{1n}(t_n) \leqslant A_1,$$
$$x_{21}(t_1) + x_{22}(t_2) + \ldots + x_{2n}(t_n) \leqslant A_2,$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$
$$x_{11}(t_1) + x_{12}(t_2) + \ldots + x_{1n}(t_n) \leqslant A_n.$$

$A_1, A_2, \ldots, A_n$ are given positive numbers. It is shown that a stabilized sequence does not contain more than 1 non-vanishing terms. Criteria for stabilized sequences are derived for another type of problems.

SUBMITTED: March 3, 1962

Card 2/2

BAKHTIN, I.A.; KRASNOSEL'SKIY, M.A.; STETSENKO, V.Ya.

Continuity of linear positive operators. Sib. mat. zhur. 3 no.1:156-160 Ja-F '62. (MIRA 15:3)
(Operators (Mathematics))

S/020/62/145/006/002/015
B112/B104

AUTHORS: Kolesov, Yu. S., and Krasnosel'skiy, M. A.

TITLE: Stability according to Lyapunov and equations with concave operators

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 6, 1962, 1217-1220

TEXT: A system $dx/dt = f(t,x)$, where $f(t+\omega,x) = f(t,x)$, is considered under the following assumptions: $f(t,x) \geqslant 0$ if at least one of the components of x vanishes; $f(t,x) \leqslant B(t)x + c$ for $x \geqslant 0$ ($B(t)$ is continuous and has the period ω); the spectrum of the matrix of monodromy to the system $dy/dt = B(t)y$ is contained in a circle with a radius $\varrho < 1$; $f(t,x) \geqslant A(t)x$ for small $x \geqslant 0$ ($A(t)$ is continuous and has the period ω, the non-diagonal components of the matrix $A(t)$ are non-negative); a certain product of components of $A(t)$ does not vanish identically, and the matrix of monodromy to the system $dy/dt = A(t)y$ has an eigenvalue which is greater than 1. It is demonstrated that the system $dx/dt = f(t,x)$ has an unambiguous ω-periodic solution which is asymptotically stable according to Lyapunov if the function $f(t,x)$ is regularly concave.

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S/020/62/145/006/002/015
B112/B104

Stability according to Lyapunov ...

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

PRESENTED: March 28, 1962, by I. G. Petrovskiy, Academician

SUBMITTED: March 23, 1962

Card 2/2

KRASNOSEL'SKIY, M.A.; SOBOLEVSKIY, P.Ye.

Structure of a set of solutions to parabolic equations. Dokl. AN SSSR 146 no.1:26-29 S '62. (MIRA 15:9)

1. Voronezhskiy gosudarstvennyy universitet. Predstavleno akademikom I.G. Petrovskim.
(Differential equations) (Operators (Mathematics))

KRASNOSEL'SKIY, Mark Aleksandrovich; PEROV, Anatoliy Ivanovich;
POVOLOTSKIY, Abram Isaakovich; ZABREYKO, Petr
Petrovich; GORYACHEV, M.M., red.; AKSEL'ROD, I.Sh.,
tekhn. red.

[Vector fields on a plane] Vektornye polia na ploskosti.
Moskva, Fizmatgiz, 1963. 245 p. (MIRA 16:11)
(Vector analysis)

L 12735-63 BDS/EWT(d)/FCC(w) AFFTC IJP(C) 56

S/208/63/003/002/014/014 53

AUTHOR: Bakhtin, I. A., Krasnosel'skiy, M. A., and Levin, A. Yu. (Voronezh)

TITLE: The localization of the extremum of a function 16 on a polyhedron

PERIODICAL: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 3, no. 2, 1963, 400-409

TEXT: Algorithms for the solution of the problem stated in the title are as yet poorly developed since the application of the general methods of differential calculus demands an independent analysis of the function along all the sides of various scales. The authors divided the problem into three parts, 1) the search for (or estimate of) the largest scale of the side whose inner point can be an extremum point, 2) the discovery of that maximum side by sufficiently simple means, and 3) the location of the extremum point proper. The paper develops such a scheme for the special function

$$\Phi(x) = \sum_{j=1}^{l} \prod_{i=1}^{n} a_{ij}^{x_{ij}} \qquad (1)$$

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L 12735-63 S/208/63/003/002/014/014

The localization of ....

3

where $0 < \alpha_{ij} \leqslant 1$, on the polyhedron

$$x_{ij} \geqslant 0, \quad x_{i1} + x_{i2} + \ldots + x_{il} = m_i \quad (i = 1, \ldots, n) \qquad (2)$$

and discusses cases with $n = 1$ and $n = 2$. The authors note that one of them (I. A. Bakhtin) completed the establishment of exact and approximate investigation method for the cases $n \leqslant 3$. The convergence of the processes presented in this paper were investigated by P. P. Zaboreyko and Yu. V. Pokornyy. Ye. G. Gol'shteyn informed the authors that he completed the study of a similar approximation method for a wide class of functions, which contains function (1) as a special case.

SUBMITTED: March 3, 1962

Card 2/2

KRASNOSEL'SKIY, M.A.; STETSENKO, V.Ya.

On certain nonlinear problems having several solutions. Sib.mat. zhur. 4 no.1:120-137 Ja-F '63. (MIRA 16:2)
(Integral equations) (Differential equations)
(Boundary value problems)

L 10611-63 EWT(d)/FCC(w)/BDS AFFTC IJP(C)

ACCESSION NR: AP3000732 S/0020/63/150/003/0463/0466

AUTHOR: Krasnosel'skiy, M. A.

TITLE: Stability of periodic solutions, originating from a state of equilibrium

SOURCE: AN SSSR. Doklady, v. 150, no. 3, 1963, 463-466

TOPIC TAGS: periodic solutions, differential equations, Lyapunov

ABSTRACT: Let the right-hand sids of the system of differential equations

$$\frac{dx}{dt} = f(t,x,\text{Lambda}) \qquad (1)$$

depend on a parameter Lambda and be periodic in t with period Omega. Let (1) have a null solution. Conditions are given under which the system (1) has nontrivial Omega periodic solutions for every value of the parameter in some neighborhood of a critical value. There exists a continuous multiplicator which assumes the value 1 at a critical value. If all the other multiplicators at a critical value assume values less than 1 in absolute value, then a solution is stable in the sense of Lyapunov at a point in some neighborhood of a critical value if and only if the continuous multiplicator assumes at that point a value less than 1. Orig. art. has: 16 formulas.

Card 1/2

Voronezh State University

KRASNOSEL'SKIY, M.A.; PUSTYL'NIK, Ye.I.

Characteristics of complete continuity of linear and nonlinear integral operators. Dokl. AN SSSR 142 no.1:25-28 Ja '62. (MIRA 14:12)

1. Predstavleno akademikom S.L. Sobolevym.
(Operators (Mathematics))

39016

K. 3400

S/140/62/000/004/005/009
C111/C333

AUTHORS: Krasnosel'skiy, M. A. Lyubarskiy, G. Ya.

TITLE: On the transition solutions of non-linear equations

PERIODICAL: Vysshiye uchebnyye zavedeniya. Izvestiya. Matematika, no. 4, 1962, 81-85

TEXT: As a transition solution of the equation

$$P\left(\frac{d}{dx}\right) y + f(y) = 0 \qquad (A)$$

where $P(\nu)$ is a polynomial of n-th ($n \geq 2$) order, one denotes every solution $y(x)$ for which there exist the finite limits

$$y_- = \lim_{x \to -\infty} y(x), \qquad y_+ = \lim_{x \to +\infty} y(x) \qquad (1)$$

where $\lim\limits_{x \to \pm\infty} y^{(k)}(x) = 0$ $(k = 1,2,\ldots,n)$. One investigates the existence and the uniqueness of the transition solutions of (A).

One supposes: $y_- < 0$, $y_+ > 0$; all zeros of $P(\nu)$ are real and single;

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S/140/62/000/004/005/009
C111/C333

On the transition solutions of ...

$f(y)$ is continuous on $[q_1, 0]$ and $[0, q_2]$; there exist $m_- > 0$ and $m_+ < 0$ such that

$$\frac{f(y_2) - f(y_1)}{y_2 - y_1} \begin{cases} < m_-, & q_1 \leq y_1 < y_2 < 0, \\ > m_+, & 0 < y_1 < y_2 \leq q_2; \end{cases}$$

$P'(0) \leq 0$, $f(0) > 0$, $f(q_1) = f(q_2) = 0$; all zeros of $P(\nu) + m_\pm$ are real and single. Let S be the set of the functions $\omega(x)$ which on $[-\infty, 0]$ and $[0, \infty]$ are continuous, satisfying $x\omega(x) \geq 0$ $(-\infty < x < \infty)$. Let S_0 be the set of those $\omega(x) \in S$ which in addition satisfy

$$q_1 \leq \omega(x) \leq q_2, \quad -\infty < x < \infty \qquad (2).$$

Let $a_- > m_-$ and $a_+ < m_+$ be such that the zeros of $P(\nu) + a_\pm$ are real and single and let $a_- q_1 = a_+ q_2$. If there denotes

Card 2/4

$$a(y) = \begin{cases} a_-, & y < 0, \\ a_+, & y \geq 0, \end{cases} \qquad \varphi(y) = ya(y) - f(y)$$

then (A) can be written down in the form

$$P(\frac{d}{dx})\, y + a(x)y = \varphi(y)\ . \qquad (3)$$

Let K(x,s) be the Green function of the operator $P(\frac{d}{dx}) + a(x)$. Under the suppositions above made one proves by aid of an operator H which maps S_0 onto S_0 where only the transition solutions of (A) are transformed into themselves:

Theorem of existence: Let f(y) be only positive in $q_1 < y < b_1$ and $b_2 < y < q_2$ $(b_1 < 0 < b_2)$. If

$$\min_{q_1 \leq y \leq b_1} \frac{y}{\varphi(y)} < \lim_{x \to -\infty} \int_{-\infty}^{0} K(x, x+s)\, ds, \qquad (6)$$

$$\min_{b_2 \leq y \leq q_2} \left| \frac{y}{\varphi(y)} \right| < \lim_{x \to +\infty} \left| \int_0^{\infty} K(x, x+s)\, ds \right| \qquad (6)$$

is satisfied, then (A) possesses at least one transition solution, for which there is $y(-\infty) = q_1$ and $y(+\infty) = q_2$.

Theorem of uniqueness: If $f(y) = ky$ has at most one solution on $q_1 < y < q_2$ for all k, then (A) possesses in S_o a unique transition solution $y(x)$.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)
Ukrainskiy fiziko-tekhnicheskiy institut AN USSR (Ukrainian Physicotechnical Institute of the Academy of Sciences of the Ukr SSR)

SUBMITTED: July 10, 1961

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000826120(

KRASNOSEL'SKIY, Mark Aleksandrovich. Prinimal uchastiye BAKEL'MAN, I.Ya.; GORYACHAYA, M.M., red.; LIKHACHEVA, L.V., tekhn. red.

[Positive solutions to operator equations in the theory of nonlinear analysis] Polozhitel'nye resheniia operatornykh uravnenii glavy nelineinogo analiza. Moskva, Gos.izd-vo fiziko-matem.lit-ry 1962. 394 p. (MIRA 15:7)

(Equations) (Operators (Mathematics))

AM4016091 BOOK EXPLOITATION S/

Krasnosel'skiy, Mark Aleksandrovich; Petrov, Anatoliy Ivanovich; Povolotskiy, Abram Isaakovich; Zabreyko, Petr Petrovich

Plane vector fields (Vektorny*ye polya na ploskosti) Moscow, Fizmatgiz, 63. 0245 p. illus., biblio. 11000 copies printed.

TOPIC TAGS: vector field, vector field on plane, field on closed curve, vector field singular points, homotopic vector field, degree of mapping singular point index, solvability of equations, boundary value problem, singular differential equation

PURPOSE AND COVERAGE: The book is devoted to an important geometrical analysis method and its applications to different problems of albegra, polynomials, function theory, and theory of ordinary differential equations. Many important results are claimed to be original with the authors. It contains applications of the theory of plane vector fields to existence theorems for systems of differ-

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AM4016091

ential equations, the arrangement of roots of polynomials, singular points and periodic solutions of ordinary differential equations, critical points of harmonic and pseudoharmonic functions, oscillation theorems, two-point boundary problems, and others. It is designed for the reader familiar only with the principles of mathematical analysis, students specializing in physics and mathematics, graduate students, and scientists interested in various nonlinear problems. It can also serve as an introduction to more complicated branches of mathematics, connected with applications of topological methods. The book is based on a special course read by one of the authors (M.A.K.) at the Voronezh University and several papers delivered to the Voronezh Seminar on Functional Analysis.

TABLE OF CONTENTS [abridged]:

AM4016091

SUB CODE: MM SUBMITTED: 04Jul63 NR REF SOV: 024

OTHER: 009 DATE ACQ: 19Dec63

Card 3/3

KRASNOSEL'SKIY, M.A.; STRYGIN, V.V.

Computation of the rotation of completely continuous vector fields related to the problem of periodic solutions to differential equations. Dokl. AN SSSR 152 no.3:540-543 S '63. (MIRA 16:12)

1. Voronezhskiy gosudarstvennyy universitet. Predstavleno akademikom A.Yu.Ishlinskim.

KRASNOSEL'SKIY, M.A.

Alternative principle of the existence of periodic solutions to differential equations with delayed arguments. Dokl. AN SSSR 152 no.4:801-804 O '63. (MIRA 16:11)

1. Voronezhskiy gosudarstvennyy universitet. Predstavleno akademikom A.Yu. Ishlinskim.

KRASNOSEL'SKY, M.A. (Voronezh)

"On some new methods in the theory of periodic solutions of ordinary differential equations."

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

L 45809-65 EWT(d)/T IJP(c)

ACCESSION NR AM4043734 BOOK EXPLOITATION S/

Vilenkin, N. YA.; Gorin, YE. A.; Kostyuchenko, A. G.; Krasnosel'skiy, M. A.; Kreyn, S. G.; Maslov, V. P.; Mityagin, B. S.; Petunin, Yu. I.; Rutitskiy, YA. B.; Sobolev, V. I.; Stetsenko, V. YA.; Faddeyev, L. D.; Tsitlanadze, E. S.

Functional analysis (Funktsional'nyy analiz), Moscow, Izd-vo "Nauka", 1964, 424 p. biblio., index. Errata slip inserted. 17,500 copies printed. Series note: Spravochnaya matematicheskaya biblioteka.

TOPIC TAGS: functional analysis, mathematics, operator equation, quantum mechanics, Hilbert space, Banach space, linear differential equation

PURPOSE AND COVERAGE: This issue in a series of Handbooks of the Mathematical Library contains such material grouped basically around the theory of operators and operator equations. It presents the basic concepts and methods of functional analysis, theory of operators in Hilbert space and in conical space, the theory of nonlinear operator equations, the theory of standard rings applied to equations in partial derivatives, to integral equations. A separate chapter is devoted to the basic operator of quantum mechanics. Citing of the theory of generalized functions takes up a large part of the book. The book explains mathematical facts; theorems and formulas, as a rule, are given.

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L 45809-65
ACCESSION NR AM4043734

without proofs. Main attention is given to concepts without excessive detail. The book is intended for mathematicians, mechanical engineers, and physicists; it contains much of value for students and graduate students.

TABLE OF CONTENTS [abridged]:

SUBMITTED: 06Feb64 SUB CODE: MA

NO REF SOV: 038 OTHER: 012

Card 2/2

ZABREYKO, P.P.; KRASNOSEL'SKIY, M.A.

Calculating the index of a fixed point in a vector field. Sib. mat. zhur. 5 no.3:509-531 My-Je '64. (MIRA 17:6)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00082612000

KRASNOSEL'SKIY, M.A.; SOBOLEVSKIY, P.Ye.

Structure of a set of solutions to a parabolic equation.
Ukr. mat. zhur. 16 no. 3:319-333 '64. (MIRA 17:7)

KRASNOSEL'SKIY, M.A.; KREYN, S.G.; [illegible]SKIY, Ye.B.; [illegible]

Mathematical events at Voronezh. Usp. mat. nauk [illegible] no.3:[illegible]-245 My-Je '64. (MIRA 17:10)

KRASNOSEL'SKIY, M.A.; STETSENKO, V.Ya.

Symposium at Dushanbe. Usp. mat. nauk 19 no.5:215-228 S-O '64.
(MIRA 17:11)

ACCESSION NR: AP4040943 S/0020/64/156/005/1022/1024

AUTHOR: Krasnosel'skiy, M. A.; Stry*gin, V. V.

TITLE: Some tests for the existence of periodic solutions to ordinary differential equations

SOURCE: AN SSSR. Doklady*, v. 156, no. 5, 1964, 1022-1024

TOPIC TAGS: analysis, differential equation, ordinary differential equation, differential equation periodic solution, periodic solution, direction function

ABSTRACT: The authors examined the existence of periodic solutions to a system of ordinary differential equations

$$\dot{x}_i = f_i(t, x_1, \ldots, x_m) \quad (i = 1, \ldots, m) \tag{1}$$

with omega-periodic right side. The article formulates tests for the existence of periodic and restricted solutions which were basically obtained by the direction function method. Some of those tests are an extension of M. A. Krasnosel'skiy and A. I. Perov's works (DAN, 123, (1958), No. 2; DAN, 152, (1963), No. 4) and of the propositions suggested by A. I. Perov in his doctoral dissertation (M. A. Krasnosel'skiy and A. I. Perov, Trudy* Mezhdunarodn simpoziuma po nelineyny*m kolebaniyam, 2, Kiev, 1963). The points of an m-dimensional domain R^m are denoted

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ACCESSION NR: AP4040943

by x. Equation (1) then can be rewritten in vector form

$$\dot{x} = f(t, x). \quad (2)$$

The authors prove six theorems to show that the system

$$\dot{x} = f(t, x(t), x[t - h(t)]). \quad (3)$$

has at least one omega-periodic function. Orig. art. has: 18 equations.

ASSOCIATION: Voronezhskiy gosudarstvennyy universitet (Voronezh State University)

SUBMITTED: 24Jan64 ENCL: 00

SUB CODE: MA NO REF SOV: 007 OTHER: 002

Card 2/2

ZABREYKO, P.P.; KRASNOSEL'SKIY, M.A.; PUSTYL'NIK, Ye.I.

Fractional powers of elliptic operators. Dokl. AN SSSR 165 no.5:990-993 D '65. (MIRA 19:1)

1. Voronezhskiy gosudarstvennyy universitet. Submitted April 26, 1965.

ZABREYKO, P.P.; KRASNOSEL'SKIY, M.A.; PUSTYL'NIK, Ye.I.

Problem involving fractional powers of operators. Usp. mat. nauk 20 no.6:87-89 N-D '65. (MIRA 18:12)

1. Submitted Jan. 21, 1965.

KRASNOSEL'SKIY, M.A. (Voronezh); LIFSHITS, Ye.A. (Voronezh)

A duality principle. Ukr. mat. zhur. 17 no.5:119-122 '65.
(MIRA 18:12)

1. Submitted March 30, 1965.

KOLESOV, Yu.S.; KRASNOSEL'SKIY, M.A.

A class of systems of ordinary differential equations with stable nonnegative periodic solutions. Uch. zap. Kaz. un. 124 no.6:158-171 '64. (MIRA 18:9)

KRASNOSEL'SKIY, M.A.; STRYGIN, V.V.

Principle of invariance of rotation of a vector field. Usp. mat. nauk. 20 no.4:200 Jl-Ag '65. (MIRA 18:8)

KRASNOSEL'SKIY, M.A.; KLIMOV, V.S.; LIFSHITS, Ye.A.

Convergence of positive functionals and operators. Dokl. AN SSSR 162 no.2:258-261 My '65. (MIRA 18:5)

1. Voronezhskiy gosudarstvennyy universitet. Submitted December 1, 1964.

ACC NR: AM6017556 Monograph UR

Krasnosel'skiy, Mark Aleksandrovich

Operator of displacement on a trajectory of differential equations (Operator sdviga po trayektoriyam differentsial'nykh uravneniy). Moscow, Izd-vo "Nauka", 1966. 331 p. illus., biblio., index. 7500 copies printed.

TOPIC TAGS: nonlinear oscillation theory, shift operator, ordinary differential equation, periodic solution, solution stability

PURPOSE AND COVERAGE: This book deals with some nonlocal problems of the theory of nonlinear oscillations. Nonautonomous systems of ordinary differential equations are considered and various problems connected with periodic and bounded solutions are studied. A considerable part of the book is devoted to methods not yet presented in monographs — the method of direction functions for proving the existence of periodic and bounded solutions, an investigation of positive periodic solutions, clarification of the connections between the stability of periodic solutions and the concavity of the shift operator, the application of the method of cones to the study of periodic solutions generated from an equilibrium state, and others. Topological and functional-analytic concepts employed in studying

Card 1/3 UDC 519.55

ACC NR: AM6017556

periodic solutions of differential equations are described in detail for the reader's convenience. The reader is required to have only a knowledge of the general facts of the theory of ordinary differential equations. This book is intended for scientists and graduate students, as well as students of mathematics and mechanics who are interested in the theory of oscillations and the qualitative theory of differential equations.

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ACC NR: AM6017556

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SUB CODE: 12/ SUBM DATE 03Jan66/ ORIG REF: 096/ OTH REF: 023

Card 3/3

ANPILOV, A.Ya.; IGNATOV, N.N.; KRASNOSEL'SKIY, M.V.

Technology of manufacturing press powders with dewatering of the slip in drier drums. Stek. i ker. 22 no.7:39-41 Jl '65. (MIRA 18:9)

1. Voronezhskiy zavod keramicheskikh izdeliy.

KRASNOSEL'SKIY, V.N.; RODNYANSKIY, I.M.; SHEYN, S.M.; GALINKER, I.S.

Conductometric analysis method for the control of alkali melting of the salts of aromatic sulfo acids. Khim. prom. 41 no.5:384-385 My '65. (MIRA 18:6)

1. Rubezhanskiy filial Nauchno-issledovatel'skogo instituta organicheskikh poluproduktov i krasiteley.

KRASNOSHAPKA, V.A. (Kiyev)

Transverse vibrations of an elastic string considering its stretching. Prikl. mekh. 1 no.2:34-39 '65. (MIRA 18:6)

1. Institut mekhaniki AN UkrSSR.

L 2963-66 FSS-2/EWT(1)/FS(v)-3/FCC/EWA(d) TT/GS/GW

ACCESSION NR: AT5023567 UR/0000/65/000/000/0077/0088

AUTHOR: Lebedinskiy, A. I.; Krasnopol'skiy, V. A.; Kuznetsov, A. P.; Tozenas, V. A.

TITLE: Investigation of terrestrial atmospheric radiation in the visible and ultraviolet regions

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 77-88

TOPIC TAGS: atmospheric radiation, visible radiation, IR radiation, UV radiation, instrumentation satellite, satellite data analysis, radiation measurement, airglow/ Cosmos 45 satellite

ABSTRACT: Measurements of airglow and scattered solar UV radiation were made by Cosmos-45 in 1964. Scattered UV radiation was measured by a UV spectrophotometer (range, 2250—3100 Å; resolution, 15 Å; field of vision, 20 km in width) operating only on the day side of the Earth. Airglow was measured by a colorimeter (field of vision, 120 km in width) operating only on the night side. For switching the instruments and fixing on the underlying surface, a sensor which measured illumination at 0.6 to 0.85 μ was used. The colorimeter carried four light filters on a common axis mounted along a disk. One filter

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