On the Asymptotic Representation of Solutions of a System of Ordinary Linear Differential Equations

treats the problem for a non-homogeneous system for the case when there are multiple roots among the roots of the characteristic equation, namely when $\lambda_1(\tau)$ is a second multiple and purely imaginary root, i.e.:

$$\lambda(\tau) \equiv \lambda_2(\tau) = i\alpha(\tau)$$

Two particular cases are analyzed: first, the "resonance" case, when the function $iK(\tau)$ may equal this root at a certain value of the parameter τ from the interval $(0, L)$; and second, the "non-resonance" case, when the function $iK(\tau) \neq \lambda_\nu(\tau)$ ($\nu = 1, 3$) at any value of from the interval

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On the Asymptotic Representation of Solutions of a System of Ordinary Linear Differential Equations

(0,L). There are 3 Soviet references.

ASSOCIATION: Kiyevskiy pedagogicheskiy institut (Kiyev Pedagogical Institute)

PRESENTED: By Member of the AS UkrSSR, I.Z. Shtokalo

SUBMITTED: April 16, 1957

NOTE: Russian title and Russian names of individuals and institutions appearing in this article have been used in the transliteration.

FESHCHENKO, S.F. (Kiyev); SHKIL', N.I. [Shkil', M.I.] (Kiyev)

Determining stresses in an elastic viscous string of variable length. Prykl.mekh. 4 no.3:269-276 '58. (MIRA 13:8)

1. Kiyevskiy pedagogicheskiy institut.
(Elastic rods and wires)

AUTHORS: Feshchenko, S.F. and Shkil', N.I. 21-58-5-3/28

TITLE: On the Asymptotic Solution of a Special System of Ordinary Linear Differential Equations (Ob asimptoticheskom reshenii spetsial'noy sistemy obyknovennykh lineynykh differentsial'nykh uravneniy)

PERIODICAL: Dopovidi Akademii nauk Ukrains'koi RSR, 1958, Nr 5, pp 482-485 (USSR)

ABSTRACT: The authors consider a system of ordinary linear differential equations which can be written in the vector-matrix form as follows:

$$E_1 \frac{dX}{dt'} = A(t')X + E_1 B(t')e^{i\theta}$$

where A (t') is a square matrix of n-order; X and B (t') are n-dimensional vectors, and E_1 is a square matrix of the n-order of the form:

$$E_1 = \{1, 1, \varepsilon, \varepsilon, \ldots, \varepsilon\}$$

Introducing a new independent variable, $t' = \varepsilon t = \tau$, the authors prove two theorems with the aid of which the asymptotic solution of the system of differential equations under

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On the Asymptotic Solution of a Special System of Ordinary Linear Differential Equations

consideration can be found. Two particular cases are analyzed: 1) the "resonance" case with certain values of τ from the segment $0 \leq \tau \leq L$, when the function $i\frac{d\theta}{dt} = iK(\tau)$ may become equal to one of the roots of the characteristic equation of matrix $A^0(\tau)$, e.g., to the root $\lambda_3(\tau)$ which is assumed to be a second multiple purely imaginary root; and 2) the "non-resonance" case, when

$$iK(\tau) \neq \lambda_j(\tau) \qquad (j = 1, 2, \ldots, n)$$

in the segment $0 \leq \tau \leq L$ where $\lambda_j(\tau)$ are roots of the same characteristic equation.
There are 3 Soviet references.

ASSOCIATION: Institut matematiki AN UkrSSR (Institute of Mathematics of AS UkrSSR)

PRESENTED: By Member of the AS UkrSSR, I.Z. Shtokalo

SUBMITTED: October 23, 1957

Card 2/3

21-58-5-3/28

On the Asymptotic Solution of a Special System of Ordinary Linear Differential Equations

NOTE: Russian title and Russian names of individuals and institutions appearing in this article have been used in the transliteration.

1. Linear equations--Theory

Card 3/3

FESHCHENKO, S.F., (Kiyev); SHKIL', N.I. (Kiyev)

Asymptotic solution of a system of linear differential equations with small parameters in the derivatives. Ukr. mat. zhur. 12 no.4:429-438 '60. (MIRA 14:3)

(Differential equations, Linear)

88305

S/041/60/012/004/006/011
C111/C222

16.3400

AUTHORS: Feshchenko, S.F., and Shkil', N.I.

TITLE: Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

PERIODICAL: Ukrainskiy matematicheskiy zhurnal, 1960, Vol. 24, No. 4, pp. 429 - 438

TEXT: The authors consider the equation

$$\frac{dx}{dt} = \left[A_0(\tau) + \varepsilon A_1(\tau)\right] x + \varepsilon B(\tau) e^{i\theta(\tau)} \tag{4}$$

where $\tau = \varepsilon t$, $B(t)$ is an n-dimensional vector and

$$A_0(\tau) = \begin{Vmatrix} 0, & 0, & \ldots, & 0 \\ 0, & 0, & \ldots, & 0 \\ a_{31}(\tau), & a_{32}(\tau), & \ldots, & a_{3n}(\tau) \\ \ldots & \ldots & \ldots & \ldots \\ a_{n1}(\tau), & a_{n2}(\tau), & \ldots, & a_{nn}(\tau) \end{Vmatrix}, \quad A_1(\tau) = \begin{Vmatrix} a_{11}(\tau), & \ldots, & a_{1n}(\tau) \\ a_{21}(\tau), & \ldots, & a_{2n}(\tau) \\ 0, & \ldots, & 0 \\ \ldots & \ldots & \ldots \\ 0, & \ldots, & 0 \end{Vmatrix}. \tag{5}$$

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S/041/60/012/004/006/011
C111/C222

Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

It is assumed that the $a_{ij}(\tau)$ the components of $B(\tau)$, and the function

(6) $$k(\tau) = \frac{d\theta(\tau)}{dt}$$

have derivatives of all orders with respect to τ on $0 \leq \tau \leq L$. A solution of (4) is sought which satisfies

(7) $$(x)_{t=0} = x_0 \quad .$$

If $\lambda_i(\tau)$, $i = 1, \ldots, n$ are the roots of

(8) $$\det | A_0(\tau) - \lambda E | = 0 \quad ,$$

then

(9) $$\lambda_1(\tau) \equiv \lambda_2(\tau) \equiv 0 \quad .$$

Let the other roots be simple on $[0,L]$, where

(10) $$\lambda_3(\tau) = i\alpha(\tau) \quad .$$

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Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

Then there exists a non-singular matrix $V(\tau)$ so that

(11) $$V^{-1}(\tau)\, A_0(\tau)\, V(\tau) = W(\tau) ,$$

where

(12) $$W(\tau) = \begin{Vmatrix} W_1(\tau) , & 0 \\ 0, & W_2(\tau) \end{Vmatrix}$$

and

(13) $$W_1(\tau) = \begin{Vmatrix} 0, & 1 \\ 0, & 0 \end{Vmatrix} , \qquad W_2(\tau) = \begin{Vmatrix} \lambda_3(\tau), & 0, & \ldots, & 0 \\ 0, & \lambda_4(\tau), & \ldots, & 0 \\ \ldots & \ldots & \ldots & \ldots \\ 0, & 0, & \ldots, & \lambda_n(\tau) \end{Vmatrix} .$$

In the present paper the solution is constructed in the case of resonance, i.e. if $k(\tau)$ in isolated points equals $\alpha(\tau)$ but for no $\tau \in [0,L]$

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Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

equals the other roots of (8).
Theorem 1 asserts that if the above conditions are satisfied and the matrix $V^{-1}(\tau)\left[A_1(\tau)V(\tau) - \frac{dV(\tau)}{d\tau}\right]$ is so that for all $\tau \in [0,L]$ it holds

$$\left\{V^{-1}(\tau)\left[A_1(\tau)V(\tau) - \frac{dV(\tau)}{d\tau}\right]\right\}_{21} \neq 0 \quad , \tag{14}$$

then the formal solution of (4) in the case of resonance admits the representation

$$x = U_1(\tau,\mu)\,\zeta_1 + \left[U_2(\tau,\mu)\,\zeta_2 + P(\tau,\mu)\right] e^{i\theta(\tau)} \quad , \tag{15}$$

where the 2-dimensional vector ζ_1 and the (n-2)-dimensional vector ζ_2 are determined by

$$\frac{d\zeta_1}{dt} = \alpha_1(\tau,\mu)\,\zeta_1$$

$$\frac{d\zeta_2}{dt} = \left[\alpha_2(\tau,\mu) - ik(\tau)E\right]\zeta_2 + Z(\tau,\mu) \quad , \tag{16}$$

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S/041/60/012/004/006/011
C111/C222

Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

while U_1 and U_2 are rectangular matrices, $\mathcal{A}_1(\tau, \mu)$ is a matrix of second order, $\mathcal{A}_2(\tau, \mu)$ is a quadratic matrix of the order (n-2); P and Z are vectors with n and (n-2) components, respectively. The determination of all these coefficients of (16) is carried out with the aid of the formal series arrangement

$$U_j(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s U_j^{(s)}(\tau) , \quad \mathcal{A}_j(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s \mathcal{A}_j^{(s)}(\tau) \quad j=1,2,$$

(17)

$$P(\tau, \mu) = \sum_{s=2}^{\infty} \mu^s P^{(s)}(\tau) , \quad Z(\tau, \mu) = \sum_{s=2}^{\infty} \mu^s Z^{(s)}(\tau) .$$

In order to show that the solution x constructed in this way is asymptotical, the authors introduce the vector x_m which originates from the vector x by restriction to m-th partial sums in the sums of (17). Theorem 2 asserts : If beside of the conditions of theorem 1 there still

Asymptotic Solutions of a System of Linear Differential Equations With a Small Parameter for the Derivatives

holds

$$\mathrm{Re}\left(\left\{V^{-1}(\tau)\left[A_1(\tau)\,V(\tau) - \frac{dV(\tau)}{d\tau}\right]\right\}_{21}\right) < 0$$

(49)

$$I\left(\left\{V^{-1}(\tau)\left[A_1(\tau)\,V(\tau) - \frac{dV(\tau)}{d\tau}\right]\right\}_{21}\right) \equiv 0 \quad ,$$

where Re is the real part and I is the imaginary part, then for arbitrary $L>0$ and $0 < \mu \leq \mu_0$ it holds

(54) $$|x - x_m| \leq \mu^{m-5} C \quad ,$$

where C is a constant not depending on μ .
There are 5 Soviet references.

SUBMITTED: May 21, 1960

Card 6/6

SHKIL', N.I. [Shkil', M.I.]

Asymptotic representation of solutions of a system of ordinary linear differential equations. Part 2. Dop.AN URSR no.2:142-145 '61.
(MIRA 14:2)

1. Kiyevskiy pedagogicheskiy institut. Predstavleno akademikom AN USSR I.Z.Shtokalo.
(Differential equations, Linear)

25006

S/044/61/000/003/007/014
C111/C333

AUTHOR: Shkil', M. I.

TITLE: On the asymptotic representation of the solutions of systems of linear differential equations, the coefficients of which depend on one parameter

PERIODICAL: Referativnyy zhurnal, Matematika, no. 3, 1961, 36, abstract 3B158. (Nauk. zap. Kyivs'k derzh. ped. in-t 1958, 30, 53-69)

TEXT: The author considers the system

$$\frac{dx}{dt} = A(\tau, \varepsilon)\, x + \varepsilon \sum_{j=1}^{N} B_j(\tau, \varepsilon)\, e^{i\theta_j}, \quad \frac{d\theta_j}{d\tau} = k_j(\tau) \quad (\tau = \varepsilon t) \quad (1)$$

where n. B_j -- h-dimensional vectors, A -- quadratic matrix. Assume that among the characteristic roots of the matrix $A(\tau,0)$ there is a double root $\lambda_1(\tau) = \lambda_2(\tau) = i\alpha(\tau)$ ($\alpha(\tau) > 0$, while the other roots (except the two conjugate λ_1 and λ_2) possess negative real parts.

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25006 S/044/61/000/003/007/014
On the asymptotic representation . . . C111/C333

The case of resonance is investigated, where $ik_r = \lambda_1$ is allowed, and the case free of resonance, where this is prohibited. In both cases the author constructs asymptotic expansions for the solutions (?); some estimations are obtained.

[Abstracter's note: Complete translation.]

Card 2/2

SHKIL', N.I. (Kiyev)

Asymptotic behavior of linear systems in the case of multiple roots of a characteristic equation. Ukr. mat. zhur. 14 no.4:383-392 '62. (MIRA 15:12)
(Differential equations)

SHKIL', N.I. [Shkil', M.I.]

Asymptotic behavior of linear systems in the case when the characteristic equation has multiple roots. Dop. AN URSR no.9:1138-1141 '62. (MIRA 18:4)

1. Kiyevskiy pedagogicheskiy institut.

SHKIL', N.I. [Shkil', M.I.]

Asymptotic solution of a system of linear differential equations with a small parameter. Dop. AN URSR no.5:572-575 '63. (MIRA 17:9)

1. Kiyevskiy pedagogicheskiy institut. Predstavleno akademikom AN UkrSSR Yu.A.Mitropol'skim [Mytropol's'kyi, IU.O.].

L 12663-63 EWT(d)/FCC(w)/BDS AFFTC IJP(C)

ACCESSION NR: AP3002866 S/0020/63/150/005/1005/1008

AUTHOR: Shkil', N. I.

TITLE: Asymptotic solutions of a system of linear differential equations with a parameter

SOURCE: AN SSSR. Doklady*, v. 150, no. 5, 1963, 1005-1008

TOPIC TAGS: asymptotic solution, linear differential equation, determinant equation

ABSTRACT: Asymptotic solutions of equation (1) of the Enclosure are determined by the behavior of roots of the determinant equation (2) of the Enclosure. The work considers those cases where several multiple elementary divisors correspond to each multiple root. Orig. art. has: 30 formulas.

ASSOCIATION: Kiyevskiy gosudarstvenny*y pedagogicheskiy institut im. A. M. Gor'kogo (Kiev State Pedagogical Institute)

SUBMITTED: 03Jan63 DATE ACQ: 15Jul63 ENCL: 01

SUB CODE: 00 NO REF SOV: 007 OTHER: 000

Card 1/2

ACCESSION NR: AP4033972 S/0140/64/000/002/0176/0185

AUTHOR: Shkil', N. I. (Kiev)

TITLE: Asymptotic solution of a system of linear differential equations in the case of a characteristic equation with multiple roots

SOURCE: IVUZ. Matematika, no. 2, 1964, 176-185

TOPIC TAGS: asymptotic solution, multiple root, characteristic equation, linear differential equation, small parameter, exterior frequency.

ABSTRACT: The author studies the system of differential equations

$$\frac{dx}{dt} = A(\tau, \varepsilon)x + \varepsilon B(\tau, \varepsilon)^{\alpha}. \quad (1)$$

Here x, $B(\tau, \varepsilon)$ are n-dimensional vectors, $A(\tau, \varepsilon)$ is a real square matrix of n^{th} order. He assumes that $A(\tau, \varepsilon)$ and the vector $B(\tau, \varepsilon)$ allow the representation

$$A(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s A^{(s)}(\tau), \quad B(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s B^{(s)}(\tau). \quad (2)$$

Card 1/5

He considers the characteristic equation of the matrix $A^{(0)}(\tau)$:

$$\det \| A^{(0)}(\tau) - \lambda E \| = 0, \qquad (3)$$

where E is the identity matrix. Its roots are denoted by $\lambda_1(\tau), \ldots, \lambda_n(\tau)$. Let $\lambda_1(\tau)$, on $[0, L]$, have constant multiplicity k_1, the root $\lambda_2(\tau)$ -- multiplicity $k_2, \ldots, \lambda_p(\tau)$ -- multiplicity k_p $(k_1 + k_2 + \ldots + k_p = n)$. Assume that the elementary divisors have the same multiplicity as their corresponding roots $\lambda_1(\tau), \ldots, \lambda_p(\tau)$. Then for the matrix $A^{(0)}(\tau)$ one can construct a nonsingular matrix $T(\tau)$ such that

$$T^{-1}(\tau) A^{(0)}(\tau) T(\tau) = W(\tau) = \begin{Vmatrix} W_{1k_1}(\tau) & 0 & \ldots & 0 \\ 0 & W_{2k_2}(\tau) & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ 0 & 0 & \ldots & W_{pk_p}(\tau) \end{Vmatrix}, \qquad (4)$$

ACCESSION NR: AP4033972

where

$$W_{rk_r}(\tau) = \left\| \begin{matrix} \lambda_r(\tau) & 1 & 0 & \cdots & 0 \\ 0 & \lambda_r(\tau) & 1 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & & \cdots & \lambda_r(\tau) \end{matrix} \right\|_{k_r}, \quad r = 1, \ldots, p. \qquad (5)$$

The author considers the "resonance" case, where the function $i\nu(\tau)\left(\nu(\tau) = \frac{d\theta}{dt},\ i = \sqrt{-1}\right)$, at isolated points of $[0,L]$, becomes equal to one of the roots of (3), for example the root $\lambda_1(\tau)$; however,

$$i\nu(\tau) \neq \lambda_k(\tau), \quad k = 2, \ldots, p, \qquad (6)$$

for any $\tau \in [0,L]$. For this case, he proves the theorem: If $A(\tau, \varepsilon)$, $B(\tau, \varepsilon)$, $\nu(\tau)$ have derivatives in τ of all orders, and the $k_1 + \ldots + k_j$ components of the vector

$$\left\{ T^{-1}(\tau)\left[A^{(1)}(\tau)\, u_j^{(0)}(\tau) - \frac{du_j^{(0)}(\tau)}{d\tau}\right],\ j = 1, \ldots, p \right\} \qquad (7)$$

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$(u_j^{(0)}(\tau)$ is the eigenvector of the matrix $A^{(0)}(\tau)$ corresponding to the root $\lambda_j(\tau)$ do not become zero on $[0,L]$, then the asymptotic solution of (1) can be represented in the form

$$x = [u_1(\tau, \mu_1) h_1 + P(\tau, \mu_1)] e^{\Phi} + \sum_{k=2}^{n} u_k(\tau, \mu_k) h_k, \quad (8)$$

where

$$\frac{dh_1}{dt} = [\lambda_1(\tau, \mu_1) - i\nu(\tau)] h_1 + z(\tau, \mu_1), \quad (9)$$

$$\frac{dh_k}{dt} = \lambda_k(\tau, \mu_k) h_k, \quad k = 2, \ldots, p. \quad (10)$$

Here the vectors $u_j(\tau, \mu_j)$, $P(\tau, \mu_1)$ and the scalar functions $\lambda_j(\tau, \mu_j)$, $z(\tau, \mu_1)$ $(j = 1,2,3,\ldots,p)$ allow the representation

$$u_j(\tau, \mu_j) = u_j^{(0)}(\tau) + \sum_{s=1}^{\infty} \mu_j^s u_j^{(s)}(\tau),$$

$$\lambda_j(\tau, \mu_j) = \lambda_j(\tau) + \sum_{s=1}^{\infty} \mu_j^s \lambda_j^{(s)}(\tau), \quad (11)$$

ACCESSION NR: AP4033972

$$P(\tau, \mu_j) = \sum_{s=0}^{\infty} \mu_j^s P^{(s)}(\tau), \quad z(\tau, \mu_j) = \sum_{s=0}^{\infty} \mu_j^s z^{(s)}(\tau),$$

where

$$\mu_j = \sqrt[k_j]{a_j}, \quad j = 1, 2, 3, \ldots, p. \qquad (12)$$

Orig. art. has: 88 formulas.

ASSOCIATION: none

SUBMITTED: 10Apr62 DATE ACQ: 07May64 ENCL: 00

SUB CODE: MA NO REF SOV: 005 OTHER: 000

Card 5/5

ACCESSION NR: AP4015118 S/0041/64/016/001/0132/0135

AUTHORS: Feshchenko, S. F. (Kiyev); Shkil', N. I. (Kiyev)

TITLE: Error estimation for asymptotic representation of solutions of linear differential equation systems containing a parameter

SOURCE: Ukr. matem. zhurnal, v. 16, no. 1, 1964, 132-135

TOPIC TAGS: error estimation, asymptotic representation, linear differential equation, ordinary differential equation

ABSTRACT: The following system of linear differential equation is considered:

$$\frac{dx}{dt} = A(\tau, \varepsilon)x + \varepsilon B(\tau, \varepsilon)e^{i\theta},$$

where x and B are n-dimensional vectors, $A(\tau, \varepsilon)$ is a real square matrix of order n,

$$A(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s A^{(s)}(\tau), \quad B(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s B^{(s)}_{(\tau)},$$

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ACCESSION NR: AP4015118

$$A^{(m)}(\tau) \neq 0, \quad 0 \leq \tau = \varepsilon t < L,$$

and ε is a small positive parameter. An algorithm for the construction of approximate solutions was given by N. I. Shkil' (UMZh t. XIV, No. 4, 1962). The asymptotic character of these approximate solutions is given in this paper. Orig. art. has: 23 equations.

ASSOCIATION: none

SUBMITTED: 26Dec62 DATE ACQ: 16Mar64 ENCL: 00

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

Card 2/2

SHKIL', N.I. [Shkil', M.I.]

Asymptotic solution of a system of linear differential equations in the case of multiple roots of a characteristic equation. Dop. AN URSR no.6:699-703 '65. (MIRA 18:7)

1. Kiyevskiy pedagogicheskiy institut.

L 50340-65 EWT(d) Pg-4 IJP(c)

ACCESSION NR: AP5008349 S/0021/65/000/003/0277/0281

12
11
B

AUTHOR: Shkil', M.I. (Shkil', N.I.)

TITLE: Improvement of the algorithm for construction of an asymptotic solution of a system of linear differential equations containing a parameter

SOURCE: AN Ukr RSR. Dopovidi, no. 3, 1965, 277-281

TOPIC TAGS: linear differential equation, asymptotic solution, solution algorithm, matrix, Jordaneau cell

ABSTRACT: This article is a continuation of the author's previous work (Doklady AN URSR, 1138, 1962) on asymptotic solutions of linear differential equations, only now an improved method is given for evaluation of some of the required coefficients. The equation to be solved is dx/dt

$$\frac{dx}{dt} = A(\tau, \varepsilon)x + \varepsilon B(\tau, \varepsilon)e^{\varphi(t,\varepsilon)}, \quad (1)$$

where x and B (τ, ε) are n-dimensional vectors, A(τ, ε) is a real square matrix of the n^{th} order and

$$A(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s A^{(s)}(\tau), \quad B(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s B^{(s)}(\tau). \quad (2)$$

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and where ε is a real but small parameter. If A (τ, ε) and B (τ, ε) have all derivatives with respect to τ over the interval (0, L), and if the kth component of the vector $T^{-1}(\tau)$ $[dU^{(0)}(\tau)/d\tau - A^{(1)}(\tau)U^{(0)}(\tau)]$ does not become zero anywhere (here $U^{(0)}(\tau)$ is the eigenvector of the matric $A^{(0)}(\tau)$ which corresponds to $\lambda_1^{(0)}(\tau)$), then the partial formal solution of (1) can be written in the form:

$$x = [U(\tau, \mu)h + P(\tau, \mu)]e^{\theta(t, \varepsilon)}, \quad (3)$$

$$\frac{dh}{dt} = [\lambda_1(\tau, \mu) - \theta(\tau)]h + z(\tau, \mu),$$

$$U(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s U^{(s)}(\tau), \qquad P(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s P^{(s)}(\tau),$$

where

$$\lambda_1(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s \lambda_1^{(s)}(\tau), \qquad z(\tau, \mu) = \sum_{s=0}^{\infty} \mu^s z^{(s)}(\tau), \quad (4)$$

$$\mu = \sqrt[k]{\varepsilon}.$$

Most of the coefficients in the above solution can be written in terms of the unknown functions λ_1^s. The improvement proposed by the author concerns an easier and more direct way in which λ_1^s may be found from the equation

$$\sum_{l_{k-1}=k-1}^{s-1} \cdots \sum_{l_0=0}^{l_1-1} Q_1^{(l_0)} \lambda_1^{(l_1-l_0)} \cdots \lambda_1^{(s-l_{k-1})} + F^{(s)} = 0, \quad (5)$$

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ACCESSION NR: AP5008349

in which $Q^{(s)} = T^{-1}U^{(s)}$ and $T(\tau)$ is a matrix such that

$$W(\tau) = T^{-1}(\tau)\,A^{(0)}(\tau)\,T(\tau) = \begin{Vmatrix} W_1(\tau) & 0 \\ 0 & W_2(\tau) \end{Vmatrix} \quad (6)$$

where $W_1(\tau)$ is a Jordaneau cell which corresponds to the root $\lambda_1^{(0)}(\tau)$ and $W_2(\tau)$ is a square matrix whose eigenvalues and $\lambda_{k1}^{(0)}(\tau), \ldots \lambda_n^{(0)}(\tau)$. Orig. art. has: 29 formulas.

ASSOCIATION: Kyyivskyy pedogogichnyy instytut (Kiev Pedagogical Institute)

SUBMITTED: 27Feb64 ENCL: 00 SUB CODE: MA

NO REF SOV: 006 OTHER: 000

me

Card 3/3

L 00343-66 EWT(d) IJP(c)

ACCESSION NR: AP5019612 UR/0376/65/001/007/0868/0879

AUTHOR: Shkil', N. I. 44 55

TITLE: Systems of linear differential equations with a small parameter applied to part of the derivatives

SOURCE: Differentsial'nyye uravneniya, v. 1, no. 7, 1965, 868-879

TOPIC TAGS: ordinary differential equation, asymptotic solution

ABSTRACT: An algorithm for constructing an asymptotic solution of a nondegenerate system of linear differential equations is offered for the case when a small parameter is a coefficient for $n-k_p$ $(2 \leq k_p \leq n)$ derivatives, and the roots of the characteristic equation and the elementary divisors corresponding to these roots have an arbitrary identical multiplicity. The system of equations is

$$E_1 \frac{dy}{dx} = A(x)y + E_1 b(x) e^{i\vartheta(x)}, \qquad (1.1)$$

where $A(x)$ is a real-valued square matrix of order n; y and $b(x)$ are n-dimensional vectors, and E_1 is a diagonal matrix of form

$$E_1 = [\overbrace{1, \ldots, 1}^{k_p}, \overbrace{\varepsilon, \ldots, \varepsilon}^{n-k_p}],$$

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L 00343-66

ACCESSION NR: AP5019612

Here ε is a small real-number parameter. With a suitable transformation, (1.1) can be written in the form $\frac{dy}{dt} = [A_0(\tau) + \varepsilon A_1(\tau)]\, y + \varepsilon b(\tau) e^{\int \ldots}$,

The asymptotic solution is then developed on the basis of the behavior of the roots of the characteristic equation

$$\det \| A_0(\tau) - \lambda E \| = 0$$

For this equation, two cases are treated: the "resonant" and the "non-resonant" case. Orig. art. has: 79 formulas.

ASSOCIATION: Kievskiy gosudarstvennyy pedagogicheskiy institut im. A. M. Gor'kogo (Kiev State Pedagogical Institute)

SUBMITTED: 18Dec64 ENCL: 00 SUB CODE: MA

NO REF SOV: 015 OTHER: 000

Card 2/2

L 00543-66 EWT(d) IJP(c)
ACCESSION NR: AP5016476 UR/0021/65/000/006/0699/0703

AUTHOR: Shkil', M. I. (Shkil', N. I.) 44,55

TITLE: On the asymptotic solution of a system of linear differential equations for the case of multiple roots of the characteristic equation

SOURCE: AN UkrRSR. Dopovidi, no. 6, 1965, 699-703

TOPIC TAGS: differential equation system, linear equation, asymptotic solution

ABSTRACT: A system of linear differential equations in n-dimensional space

is considered, and the form of the asymptotic solution is considered for the case of multiple roots of the characteristic equation; in particular, the "resonance" case is considered when the external frequency becomes equal at various points of the segment [0, L] to one of the identical multiple natural frequencies of the system of equations. Solution is obtained in terms of formal series in powers of the parameter

$$\mu_i = \sqrt[k_i]{\varepsilon_i}$$

where $k_j > 2$ (k_j is the multiplicity of the natural frequency $\lambda_j^{(0)}$, $j = 1, \ldots, p$) in the form:

Card 1/3

L 00543-66
ACCESSION NR: AP5016476

$$x = [U_1(\tau, \mu_1) h_1 + P(\tau, \varepsilon)] e^{i\theta(t,\varepsilon)} + \sum_{k=2}^{p} U_k(\tau, \mu_k) h_k,$$

$$\frac{dh_1}{dt} = [\lambda_1(\tau, \mu_1) - i\omega(\tau)] h_1 + z(\tau, \varepsilon),$$

$$\frac{dh_k}{dt} = \lambda_k(\tau, \mu_k) h_k, \qquad k = 2, \ldots, p,$$

where $U_j(\tau, \mu_j)$ and $P(\tau, \epsilon)$ are n-dimensional vectors, $\lambda_j(\tau, \mu_j)$ and $z(\tau, \epsilon)$ are scalar functions which can be formally expanded:

$$U_j(\tau, \mu_j) = \sum_{s=0}^{\infty} \mu_j^s U_j^{(s)}(\tau), \qquad \lambda_j(\tau, \mu_j) = \sum_{s=0}^{\infty} \mu_j^s \lambda_j^{(s)}(\tau),$$

$$P(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s P^{(s)}(\tau), \qquad z(\tau, \varepsilon) = \sum_{s=0}^{\infty} \varepsilon^s z^{(s)}(\tau),$$

$$\mu_j = \sqrt[k_j - 1]{\varepsilon}, \qquad j = 1, \ldots, p.$$

Card 2/3

L 00543-66
ACCESSION NR: AP5016476

This report was presented by Yu. O. Mytropol's'kyy (Yu. A. Mitropol'skiy). Orig. art. has: 29 formulas.

ASSOCIATION: Kyyivs'kyy pedahohichnyy instytut [Kievskiy pedagogicheskiy institut] (Kiev Pedagogical Institute)

SUBMITTED: 04May64 ENCL: 00 SUB CODE: MA

NR REF SOV: 008 OTHER: 000

Card 3/3

ROCHEV, N.N., glav. red.; VAVILOV, P.P., red.; VERTEL', E.I., red.; GORELIK, A.I., red.; GUZMAN, I.S., red.; KUZNETSOV, G.N., red.; MEDVEDEV, G.A., red.; MODYANOV, Ya.V., red.; PANTELEYEVA, A.A., red.; POLYAKOV, V.V., red.; POPOV, S.A., red.; POPOVA, S.M., red.; RAYEVSKIY, S.S., red.; RUDAKOV, S.V., red.; SYUTKIN, A.F., red.; USOV, A.I., red.; USTINOVA, I.K., red.; SHKIL', P.T., red.; CHEBYKIN, N.P., red.; MEZENTSEV, S.A., red.; MOROZOV, V.S., red.; OPLESNIN, I.I., tekhn. red.

[Forty years of the Komi A.S.S.R., 1921-1961; studies on the cultural and economic development of the Komi Republic]40 let Komi ASSR, 1921-1961; ocherki o razvitii ekonomiki i kul'tury Komi Respubliki. Syktyvkar, Komi knizhnoe izd-vo, 1961. 154 p. (MIRA 14:11)
(Komi A.S.S.R.--Economic conditions) (Komi A.S.S.R.--Culture)

L 21[illegible]-66 EWT(d)/EPA(s)-2/EWT(m)/EWP(v)/EWP(j)/T/EWP(t)/EWP(k)/EWP(h)/EWP(b)
ACCESSION NR: AP5020162 EWP(l)/EWA(c) JD/HM/RM UR/0135/65/000/008/0025/0027
621.791:534-8:621.315.3

AUTHORS: Kagan, Ya. I. (Candidate of physico-mathematical sciences); Neonet, V. P. (Engineer); But, A. A. (Engineer); Shkil', V. M. (Engineer)

TITLE: Ultrasonic welding of lacquer- or enamel-insulated wire connections

SOURCE: Svarochnoye proizvodstvo, no. 8, 1965, 25-27

TOPIC TAGS: ultrasonic welding, wire connection, wire welding, insulated wire/ PEV wire insulation, PEL wire insulation, PSDK wire insulation, BPVL wire insulation, PGV wire insulation, UZSM 1 ultrasonic welder

ABSTRACT: To determine the feasibility of ultrasonic welding of wire connections without prior removal of the insulation, a range of copper and aluminum wire sizes (insulation types PEV, PSDK, BPVL, PETV-TL, PGV, and PEL) were experimentally welded on ultrasonic welder UZSM-1 into wire-to-wire and wire-to-copper plate connections. The contact force, welding time, and ultrasonic vibration amplitude for best connection strength were determined for each case, and a table of best parameters for 22 different connections is presented. It was found that the wires had to be held properly during the welding process (see Fig. 1 on the Enclosure) to give satisfactory connections. It was also found that [illegible] and multi-strand copper wires

L 2446-66
ACCESSION NR: AP5020162

(with PEL or PEV insulation) and aluminum wires (without insulation) could be welded without difficulty into wire-to-wire and wire-to-copper plate connections (for all wire diameters). Insulated aluminum single-strand wires above 2 mm in diameter could also be welded, but smaller diameters required special care and gave unsatisfactory results. The static strength in tension-shear of the connections was found to be 75-90% of the wire strength, but only 30-35% of this force was required to pull the weld apart (perpendicular to axis). The resistance of the connections was more than 85% of the wire resistance. Orig. art. has: 2 tables and 2 figures.

ASSOCIATION: VNIITELEKTROMASh

SUBMITTED: 00 ENCL: 01 SUB CODE: IE

NO REF SOV: 000 OTHER: 000

Card 2/3

L 2446-66

ACCESSION NR: AP5020162

ENCLOSURE: 01

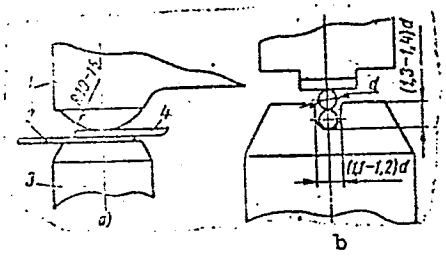

Fig. 1. Welding head geometry for wire-to-plate (a) and wire-to-wire (b) welds: 1- instrument, 2- plate, 3- reflector, 4- wire

BVK

Card 3/3

ACC NR: AT6033109 SOURCE CODE: UR/0137/66/000/007/E034/E034

AUTHOR: Kagan, Ya. I.; Neonet, V. P.; But, A. A.; Shkil', V. M.

TITLE: Ultrasonic welding of wire enamel insulation

SOURCE: Ref. zh. Metallurgiya, Abs. 7E242

REF SOURCE: Tr. Vses. n.-i. in-ta tekhnol. elektromashino- i apparatostr., vyp. 3, 1965, 30-46

TOPIC TAGS: ultrasonic welding, electric wire, insulated wire, enameled wire, wire insulation, wire welding

ABSTRACT: An analysis was made of the process of ultrasonic welding of electric wire without removing the layer of enamel or varnish insulation or perliminary preparation of surface. The possibility has been established for welding single-core and multicore PEL and PEV insulated copper electric wires to each other and to a Cu plate for practically all diameters used in the electrical industry, as well as aluminum single-core uninsulated electric wires to each other, to insulated single-core Cu wires, and multicore uninsulated Al wires to Cu plates. Welding of

 UDC: 621.791.16

L 09391-67
ACC NR: AR6033109

single-core Al electric wires with PEV or PEL insulation > 2 mm diameter can be conducted with the maximum amplitudes. V. Fomenko. [Translation of abstract]

SUB CODE: 13

Card 2/2

SHKILEV, A.V., student; STEKOL'NIKOV, I.S., prof., doktor.

Using a photomultiplier in studying long sparks. Izv. TPI 95: 80-87 '58. (MIRA 14:9)
(Photoelectric multipliers) (Electric spark)

STEKOL'NIKOV, I.S. (Moskva), SHISTER, A.R. (Moskva), SHKILEV, A.V., (Moskva)

Calculation of induced overvoltages in electric power transmission lines. Izv. AN SSSR. Otd. tekh. nauk. Energ. i avtom. no.6:23-27 N-D '60. (MIRA 13:12)
(Electric lines--Overhead) (Lightning protection)

88403

S/020/61/136/004/010/026
B019/B056

24.2500

AUTHORS: Stekol'nikov, I. S., Shkilev, A. V.

TITLE: New Data on the Development of Long Spark Channels

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 4, pp. 803 - 806

TEXT: By means of an electronic-optical amplifier, and a quick-operation electron-beam oscilloscope, the authors obtained new data on the development of the spark channel for voltage pulses in a discharge between a rod (+) and a plane (-). The discharge gaps varied from 3.0 to 5.75 m. Static pictures of the development of the spark were taken; a time scanning of the development was carried out by means of photographic plates, and oscillograms of the discharge current were taken. Experiments carried out with a discharge gap of 5.3 m are discussed in detail. From a time scanning of the development of spark discharge, which was begun at the instant at which the leader attained a length of 3.8 m, it may be seen that with the approach of the leader to the negative plate, two jumps in the velocity of the leader may be observed. These are accompanied by an

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88403
S/020/61/136/004/010/026
B019/B056

New Data on the Development of Long Spark Channels

increase of the luminosity of the leader, and considerable increase of the discharge current is observed. The length of such gaps as covered by the leader during these jumps are between 10 and 125 cm, depending on the length of the discharge gap. It is noted that the contribution of the last jump to the recorded current pulse is considerable. It is concluded that the leader jumps are related to an equalization of the electric field in the existing spark and to an increase of the mean potential gradient of the space charge. On the basis of experimental results, the authors set up a relation that permits calculating the length of the last jump:

$$S_f = \frac{E_{mean} - E_1 - 1.3\, R_o 1^{-0.12R_o}}{E_f - E_1} \cdot S_o \quad [cm] .$$

Here, E_{mean} is the mean gradient in the discharge gap; E_1 is the gradient of the spark before the last jump; E_f is the gradient in the gap, in which the last jump occurs; S_o is the discharge gap; and R_o is the ohmic resistance of the pulse generator. Ye. N. Brago and I. S. Stekol'nikov are mentioned. There are 4 figures and 9 Soviet references.

Card 2/3

88403

New Data on the Development of Long Spark Channels

S/020/61/136/004/010/026
B019/B056

ASSOCIATION: Energeticheskiy institut im. G. M. Krzhizhanovskogo Akademii nauk SSSR (Institute of Power Engineering imeni G. M. Krzhizhanovskiy, Academy of Sciences USSR)

PRESENTED: July 16, 1960, by L. A. Artsimovich, Academician

SUBMITTED: July 15, 1960

Card 3/3

STEKOLNIKOV, I. S.; SHKILEV, A. V.

"New Data on Negative Spark Developement and its Comparison with Lightning" International Conference on Gas Discharges and the Electricity Supply Industry", 7-11 May 1962., Leatherhead, UK.

1. Krzhizhanovski Power Institute, Laboratory of High Voltage Gas Discharges, Moscow, U. S. S. R.

STEKOL'NIKOV, I.S.; SHKILEV, A.V.

New data on the development of a negative spark as compared with lightning. Dokl.AN SSSR 145 no.4:782-785 Ag '62. (MIRA 15:7)

1. Energeticheskiy institut im. G.M.Krzhizhanovskogo. Predstavleno akademikom L.A.Artsimovichem.
(Electric spark)

L 15464-63 EWT(1)/BDS AFFTC/ASD
ACCESSION NR: AP3005437 S/0020/63/151/005/1085/1088

52

AUTHORS: Stekol'nikov, I. S.; Shkilev, A. V.

TITLE: Analysis of the mechanism of the negative spark

SOURCE: AN SSSR. Doklady*, v. 151, no. 5, 1963, 1085-1088

TOPIC TAGS: spark formation mechanism, electrical discharge in gas, spark sweep photograph, electrical discharge, gas

ABSTRACT: Authors studied spark development under exponential waves of applied voltage, which is characterized by an average slope between time zero and a time equal to 2.3 of the time constant. Figures 1, 2, and 3 show the sweep photograph of the spark development with respect to time. Figure 4 shows the processes schematically. A detailed description of the different stages of the process is given. The main features leading to spark breakthrough are: (i) polar corona; (ii) stepped spark leader; (iii) negative leader and jump-like leader; (iv) volume leader; (v) positive leader; (vi) final jump; (vii) the main channel. Orig. art. has: 4 figures.

Card 1/2

STEKOL'NIKOV, I.S.; SHKILEV, A.V.

Development of a long positive spark on an oblique voltage wave.
Dokl. AN SSSR 151 no.4:837-840 Ag '63. (MIRA 16:8)

1. Predstavleno akademikom L.A.Artsimovichem.
(Electric spark)

L 40803-66 EWT(1)/FCC GW

ACC NR AP6027731 SOURCE CODE: UR/0020/66/169/004/0803/0806

AUTHOR: Bazelyan, E. M.; Gorin, B. N.; Stekol'nikov, I. S.; Shkilev, A. V.

ORG: Power Engineering Institute im. F. M. Krzhizhanovskiy (Energeticheskiy institut)

TITLE: Some results of studies of lightning with image converter equipment

SOURCE: AN SSSR. Doklady, v. 169, no. 4, 1966, 803-806

TOPIC TAGS: lightning, image converter, image intensifier

ABSTRACT: Results of a study of the characteristics of lightning using an image converter system are reported. The system uses two individually controlled image tubes which can operate in either of two modes: a single-frame image display with the exposure controlled by the shutter pulse; or a continuous image display at speeds of $3 \cdot 10^3$—$2 \cdot 10^5$ cm/sec. By connecting the system to an oscillograph, both the electrical and optical characteristics of lightning can be recorded simultaneously. The data showed that the system successfully determines the number and speed of components in a lightning discharge. On the basis of seven measurements, an average speed of the front part of the lightning was calculated to be 0.7×10^{10} cm/sec. Orig. art. has: 4 figures. [IV]

SUB CODE: 09, 04/ SUBM DATE: 28Mar66/ ORIG REF: 003/ OTH REF: 003/ ATD PRESS: 5059

Card 1/1 UDC: 551.594.22

ACC NR: AT7000834 (A) SOURCE CODE: UR/0000/66/000/[illegible]/0097/0110

AUTHORS: Stekol'nikov, I. S. (Doctor of technical sciences, Professor); [illegible]kilev, A. V.

ORG: none

TITLE: The growth of a long spark and lightning

SOURCE: Moscow. Energeticheskiy institut. Problemy elektroenergetiki (Problems of electric power engineering). Moscow, Izd-vo Nauka, 1966, 97-110

TOPIC TAGS: lightning, spark gap, image converter, corona discharge, wave front, camera / Boys camera

ABSTRACT: To increase the understanding of the growth process of long sparks, laboratory studies were conducted. In these, the eopographs (image-converter tube graphs) were constructed using an electron-converter tube with light amplification. To record the discharge current and voltage in the gap, a high speed electronic oscillograph was used. High optical sensitivity permitted a sharp focusing of the weak light fluxes of the initial spark stages. These spark studies were conducted with three different gap arrangements: 1) a positive rod and negative plate (+c-n); 2) a negative rod and positive plate (-c+n); 3) a negative rod and positive plate with a rod mounted on it (-c+c/n). The leader process in the air gap was found to develop in two ways. With a + voltage wave, the leader consists of a channel and

Card 1/2

NEKIPELOV, N.V.; BELYAYEVA, N.S.; SHKILEV, V.V.

Characteristics of changes in murine rodent numbers in regions along the southern border of Maritime and Khabarovsk Territories. Izv. Irk. gos. protivochum. inst. 12:191-206 '54. (MIRA 10:12)
(KHABAROVSK TERRITORY--MICE)
(MARITIME TERRITORY--MICE)

SHKILEV, V.V.

Materials on the dynamics of rodent numbers in settled areas of the Maritime Territory. Izv. Irk. gos. protivochum. inst. 12: 231-244 '54. (MIRA 10:12)
(MARITIME TERRITORY--RODENTIA)

TERESHCHENKO, I.F.; VOLCHENKOV, Z.S.; SHKILEV, V.V.

Finding of Daurian hamsters, field mice, and weasels spontaneously infected with plague. Izv.Irk.gos.nauch.-issl.protivochum.inst. 15:79-82 '57. (MIRA 13:7)
(TUNGLIAO--RODENTIA--DISEASES AND PESTS) (PLAGUE)

SHKILEV, V.V.; ZHOVTYY, I.F.

Note of fleas of rodents of the Manchurian plain. Izv.Irk.gos. nauch.-issl.protivochum.inst. 15:323-325 '57. (MIRA 13:7)
(MANCHURIA--FLEAS) (PARASITES--RODENTIA)

SHKILEV, V.V.

New data on the biology of Cricetulus triton nestor Thos. Izv. Irk.gos.nauch.-issl.protivochum.inst. 16:114-124 '57. (MIRA 13:7)

(HAMSTERS)

SHKILEV, V.V.; GRYAZNOV, Ye.A.; SYCHEVSKIY, P.T.

Plague outbreak among Brandt's field voles in the Mongolian People's Republic. Izv.Irk.gos.nauch.-issl.protivochum. inst. 19:50-59 '58. (MIRA 13:7)
(Plague) (Mongolia--Field mice)

SHKILEV, V.V.

Ecology of household mice in Manchuria. Izv.Irk.gos.nauch.-issl.protivochum.inst. 19:83-93 '58. (MIRA 13:7)
(Manchuria--Mice)

SHKILEV, V.V.; TEMNIKOVA, L.V.

Case of importation of black rats into the city of Ussuriysk.
Izv.Irk.gos.nauch.-issl.protivochum.inst. 19:98-100 '58.
(MIRA 13:7)

(Ussuriysk—Rats)

SHKILEV, V.V.; MOSKALENKO, V.V.

Diurnal activity of rodents of the Maritime Territory. Izv. Irk.gos.nauch.-issl.protivochum.inst. 19:110-116 '58. (MIRA 13:7)

(Maritime Territory--Rodentia)

SHKILEV, V.V.; SYCHEVSKIY, P.T.; NECHAYEVA, N.N.; MOSKALENKO, V.V.

Parasites of muskrat in the Maritime Territory. Soob.DVFAN SSSR no.11:155-157 '59. (MIRA 13:11)

1. Krayevaya protivoepidemicheskaya stantsiya Primorskogo kraya.
(Maritime Territory--Muskrats--Diseases and pests)

SHKILEV, V.V.

Materials on the reproduction of field mice in the Maritime Territory. Izv. Irk. gos. nauch.-issl. protivochum. inst. 21:265-278 '59. (MIRA 14:1)

(MARITIME TERRITORY--FIELD MICE)

SPKIJ.V, V.V.

Results of the control of water rats in Yakutia. Dokl. Irk. gos. nauch.-issl. protivochum. inst. no.5:218-223 '63 (MIRA 18:1)

SHKILEVSKIY, Ya.A.

SHKILEVSKIY, Ya.A.

"Using electric equipment in prospecting for sources of water supply" by A.M.Gorelik and others. Reviewed by IA.A.Shkilevskii. Transp.stroi. 7 no.7:32 Jl '57. (MIRA 10:11)

1. Nachal'nik geofizicheskoy partii Lengiprotransa.
(Water supply) (Gorelik, A.M.)

SHKIL'KO, G., inzh. (Khar'kov)

Television eye explores the depths of the oceans. Tekh. mol. 31 no.8:4 '63. (MIRA 16:11)

YURASOV, L., inzh.; SHKIL'KO, G., inzh.

Diving lasers. IUn.tekh. 8 no.11:49-51 N '63. (MIRA 16:12)

SHKIL'KO, G.Ya., inzhener.

Checking the condition of insulation in low-voltage motors.
Prom.energ. 11 no.7:8-9 Jl '56. (MLRA 9:10)

(Electric insulators and insulation)
(Electric motors)

SHKIL'KO, G.Ya., inzhener.

Conditions for normal operation and long life of the ball and roller bearings of electric motors. Prom.energ. 11 no. 11:5-9 N '56. (MLRA 9:12)

1. Khar'kovskiy elektrotekhnicheskiy zavod.
(Bearings (Machinery))

SHKIL'KO, G.Ya., inzhener.

Manufacturing the rotor windings of squirrel-cage motors.
Vest.elektroprom. 27 no.5:39-40 My '56. (MLRA 9:12)

1. KhELZ.
(Electric morors, Induction)
(Alumimum founding)

SHKIL'KO, G.Ye., inzhener.

Hermetic floating packing of electric motor shafts. Vest. elektroprom. 27 no.6:72-73 Je '56. (MLRA 10:8)
(Electric motors)
(Packing (Mechanical engineering)

SHKIL'KO, G.Ya., inzhener.

Protecting electric motors from the effects of unfavorable surrounding conditions. Prom.energ. 12 no.9:25-29 S '57. (MIRA 10:10)

1.Khar'kovskiy elektrotekhnicheskiy zavod.
(Electric motors)

SHKIL'KO, G.Ya., inzh.

Best frequency and tension in ship electric power plants using alternating current. Sudostroenie 22 [i.e.23] no.10:25-27 O '57.
(Electricity on ships) (MIRA 11:2)

110-6-9/24

AUTHOR: Shkil'ko G.Ya., Engineer.

TITLE: The use of silicon organic insulation in electrical machine construction. (Primeneniye kremniyorganicheskoy izolyatsii v elektromashinostroyenii.)

PERIODICAL: "Vestnik Elektropromyshlennosti" (Journal of the Electrical Industry) 1957, Vol.28.No.6, pp.31-34 (U.S.S.R.)

ABSTRACT: The field of application of silicone insulation is first considered. It may be used to reduce the dimensions and weight of the equipment or to improve the reliability. Some change in the design of copper and iron is usually necessary. The application of silicone insulation is limited in small motors because available silicon-organic enamel cannot be used to manufacture strong coverings for fine wires because of its poor adhesion to copper and inadequate hardness.

The selection of electro-magnetic loading and of machine geometry is then considered. The high thermal stability of silicone insulation permits the use of higher electro-magnetic loading. To determine the increase of power that can be achieved in motors with silicone insulation it is necessary to determine the permissible increase in copper losses whilst maintaining the efficiency at about the same level. Equations

Card 1/3

The use of silicon organic insulation in electrical machine construction. (Cont.) 110-6-9/24

Glass-mica insulation with silicone binders is somewhat fragile and brittle and so the space factor in the slots must be somewhat less than with normal insulation. Unless the insulation is properly treated it will not be water-resistant. It is concluded that the production of machines with silicone insulation should be increased. Further improvement in machines with silicone insulation necessitates the use of electrical steels of improved properties and also heat-resistant bearings and lubricants.
There is 1 figure.

Card 3/3

ASSOCIATION: KhELZ.

SUBMITTED: June 15, 1956.

AVAILABLE:

AUTHOR: Shkil'ko, G.Ya., Engineer SOV/91-58-3-3/28

TITLE: A Method to Decrease the Possibility of Damage to the Windings of 3-Phase Motors at the Break of One Phase (Meropriyatiya, umen'shayushchiye vozmozhnost' povrezhdeniya obmotok trëkh-faznykh dvigateley pri obryve odnoy fazy)

PERIODICAL: Energetik, 1958, Nr 3, pp 5-7 (USSR)

ABSTRACT: The author puts down his recommendations to decrease the possibility of the above mentioned damages at the break of one phase or when any considerable non-uniformity of voltage occurs in phases: 1) the stator windings have to be star-connected; 2) all three phases have to be equipped with identical fuse links; 3) stationary and mobile joints as well as winding insulation have to be periodically examined; 4) the control circuit has to be connected with the network by means of a magnetic starter equipped with safety fuses corresponding

Card 1/2

A Method to Decrease the Possibility of Damage to the Windings of 3-Phase Motors at the Break of One Phase

to the control current intensity. The editors add a remark saying that since it is practically impossible to find absolutely identical fuse links, it is necessary to apply rather less-sensitive fuses.
There is 1 circuit diagram.

SHKIL'KO, G.Ya., inzh.

Measures to reduce the danger of damage to three-phase motor coils upon breaking of one phase. Sudostroenie 24 no.2:38-39 F '58.
(Electric motors, Polyphase) (MIRA 11:3)

14(1) SOV/66-59-2-5/31

AUTHOR: Shkil'ko, G., Engineer

TITLE: Built-in Electric Motors for Freon Compressors (Vstroyennyye elektrodvigateli freonovykh kompressorov)

PERIODICAL: Kholodil'naya tekhnika, 1959, Nr 2, pp 16-20 (USSR)

ABSTRACT: The Khar'kovskiy elektrotekhnicheskiy zavod (Khar'kov Electrotechnical Plant) has started production of built-in motors for Freon compressors used for household and commercial refrigerators turned out by the Khar'kovskiy zavod torgovogo mashinostroyeniya (Khar'kov Commercial Machine Building Plant). Standard sizes are recommended for 3-phase motors of 60 to 700 w capacity with not more than 6.5 fold starting current overload. The article indicates technical requirements for the material employed in the construction of the motors, including insulation. For well designed refrigeration engines-compressors with 1,450 rpm, the ratio of the nominal power of the motor to the cold production of the compressor can be put under normal conditions at 0.5 w per 1 kcal/hr. The article gives the power characteristics of the motors. Graph 3 gives the admissible values of overload for the starting current plotted versus the

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power values of the motors. Compressors can be produced with built-in single-phase or 3-phase motors. The article describes various starting circuits for single-phase motors, indicating the starting and maximum torque, the starting current and the conditions for the applications of the various circuits. Description is also given of combined safety relays. The starting of a built-in 3-phase motor of an enclosed compressor group and its switching on and off does not differ in pronciple from the system used in belt-driven compressors.
There are: 1 schematic diagram; 4 graphs, 2 tables and 2 Soviet references.

ASSOCIATION: Khar'kovskiy elektrotekhnicheskiy zavod (Khar'kov Electrotechnical Plant)

8(5) SOV/105-59-3-12/27

AUTHORS: Shkil'ko, G. Ya., Engineer, Sogin, G. V., Engineer

TITLE: Performance of Squirrel-cage Induction Motors at Low Ambient Temperatures (Rabota asinkhronnykh korotkozamknutykh dvigateley pri nizkikh temperaturakh okruzhayushchey sredy)

PERIODICAL: Elektrichestvo, 1959, Nr 3, pp 56 - 58 (USSR)

ABSTRACT: When a choice is to be made of motors with a maximum power of 5 kw, which operate on building sites at temperatures ranging from +35° to - 20°C (according to the supplement to GOST 186-52), sometimes even to temperatures as low as -50°C, the modification of the characteristic curves of such motors must be taken into account. This is an investigation of the problem. The modifications of the characteristics are studied of motors, which are due to ambient temperature changes, and of motors of a general industrial design, which operate at temperatures down to -20°C. The question is raised and discussed, whether special designs would be expedient for motors, which operate under temperatures up to -50°C, and finally motors which operate under ambient temperature changes from +50 to - 50°C. Summarizingly the following statements are made: 1) If temperature changes from -20 to

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+35°C are encountered (temperature interval 55°C) motors of a general industrial design can be used. At lower temperatures checks must be made, whether the starting torque corresponds to the braking torque. If it is necessary, the deviation of the starting current from the rated value given in the catalog must be taken into account. 2) The temperature ranges of from -50 to +10°C and from -50 to +50°C do not seem appropriate in the case of motors of a low capacity. The use of frost-proof motors, which are intended for such purposes, guarantees a reduction in weight, of outside dimensions and of raw material expenditure. This also results in a reduction of running costs because of an improvement of the power indices. 3) It proved to be advisable to introduce the concept of standard or calculation temperature in the design of conventional industrial motors and of low-temperature motors. It is specified as the temperature, where the ambient temperature dependent characteristics must agree with the values given in the catalog. There is 1 figure.

Performance of Squirrel-cage Induction Motors at Low Ambient Temperatures

SOV/105-59-3-12/27

ASSOCIATION: Khar'kovskiy elektrotekhnicheskiy zavod (Khar'kov Electrotechnical Factory)

SUBMITTED: November 29, 1958

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SHKIL'KO, G.Ya., inzh.

Calculating the operation of electric motors for replacement of bearings. Prom. energ. 14 no.1:16-18 Ja '59. (MIRA 12:1)

1.Khar'kovskiy elektrotekhnicheskiy zavod.
(Electric motors) (Bearings (Machinery))

S/091/60/000/009/002/003
A151/A029

AUTHOR: Shkil'ko, G. Ya., Engineer

TITLE: Properties and Applications of Microelectric Motors

PERIODICAL: Energetik, 1960, No. 9, pp. 30-36

TEXT: The percentage of microelectric motors in relation to the total amount of electric motors in operation increased considerably, due to mechanization and automation of industrial processes and to an increasing use of electric appliances in households. The author emphasizes the imperative role of the selection of a certain type of such motors that would best suit local requirements with respect to adaptability to given environments, their cost, available current supply, etc. New models of a-c and d-c collector-type microelectric motors and new models of built-in three-phase and single-phase motors with shorted rotors are being developed at present to alleviate the problem of selecting a proper motor for a given task. A table (pp. 31-35) lists a variety of already available microelectric motors, specifying their types, circuit diagrams, mechanical characteristics, rate of power, speed of revolution, rated variability of the speed of

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revolutions, possibility of reversing by means of switches, availability of special starting devices, radio interferences at starting and in the course of operation, structural peculiarities and the fields of application. There is 1 table.

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SHKIL'KO, G.Ya., inzh.

Calculating the frequency for antifriction bearings with grease. Prom.energ. 15 no.3:42-43 Mr '60. (MIRA 13:6)
(Bearings(Machinery)--Lubrication)

SHKIL'KO, G.Ya., inzh.

Construction of hand-starters and their use. Prom.energ. 15 no.4:27-28 Ap '60. (MIRA 13:6)
(Electric apparatus and appliances)

SHKIL'KO, G.Ya., inzh.

Modern designs of electric motors for driving gas and liquid circulating pumps. Prom. energ. 17 no.9:37-45 S '62. (MIRA 15:8)

(Pumping machinery, Electric) (Electric motors)

SHKIL'KO, G.Ya., inzh.

Change of consistent lubricants in the ball bearing assemblies of electric motors. Energetik 10 no.10:30-33 O '62. (MIRA 15:12)
(Electric motors--Lubrication)

SHKIL'KO, Grigoriy Yakovlevich; DONSKOY, Ya.Ye., red.; SHEVCHENKO, M.G., tekhn. red.

[Decrease of metal consumption in machinery designs] Snizhenie metalloemkosti konstruktsii. Khar'kov, Khar'kovskoe knizhnoe izd-vo, 1962. 46 p. (MIRA 16:7)

1. Glavnyy konstruktor Khar'kovskogo elektrotekhnicheskogo zavoda (for Shkil'ko).
(Metals) (Electric equipment industry)

SHKIL'KO, G.Ya., inzh.

Asynchronous motors with angular velocity regulation or reduction. Prom. energ. 18 no.3:42-47 Mr '63. (MIRA 16:6)

(Electric motors, Induction)

SHKIL'KO, G.Ya.

Water cooled small asynchronous motors. Energ. i elektrotekh. prom. no.2:11-13 Ap-Je '63. (MIRA 16:7)

1. Khar'kovskiy elektrotekhnicheskiy zavod.
(Electric motors, Induction)

SHKIL'KO, [illegible]

New standard series of asynchronous motors. Energetik no.9:38-40 S '64. (MIRA 17:10)

SHKIL'KO, G.Ya., inzh.; SOGIN, G.V., inzh.

Measurement of the torque of an asynchronous motor during the heating of the windings. Elektrotekhnika 34 no.9:71-72 S '63. (MIRA 16:11)

SHKIL'KO, G.Ya., inzh.

Single-phase induction motors based on three-phase ones. Energ. i elektrotekh. prom. no.4:54-56 O-D '64. (MIRA 18:3)

SHKIL'KO, G.Ye., [illegible]

[illegible] of a system for the design documentation of electric [illegible] of a unified series. Elektrotekhnika 36 no.2:42-46 (MCR: 18:10)

SHKINEV, A.N., redaktor; MEDVEDEV, L. Ya., tekhnicheskiy redaktor.

[Norms and technical requirements in designing steel structural elements] Normy i tekhnicheskie usloviia proektirovaniia stal'nykh konstruktsii (N i TU 121-55) Moskva, Gos. izd-vo lit-ry po stroitel'stvu i arkhitekture, 1955. 70 p. (MLRA 8:8)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam stroitel'stva.
(Building, Iron and steel)

SHKINEV, A., inzhener, redaktor; PEVZNER, A.S., redaktor; MEDVEDEV, L.Ia., tekhnicheskiy redaktor.

[Norms and technical requirements for designing concrete and reinforced concrete construction (NiTU 123-55)] Normy i tekhnicheskie usloviia proektirovaniia betonnykh i zhelezobetonnykh konstruktsii (NiTU 123-55). Moskva, Gos.izd-vo lit-ry po stroitel'stvu i arkhitekture, 1955. 107 p.(MLRA 8:11)

1. Rossia (1923- U.S.S.R.) Gosudarstvennyy komitet po delam stroitel'stva.
(Concrete construction)