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ABSTRACTS

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SOLVABILITY OF A CLASS OF NONLINEAR FREDHOLM INTEGRAL EQUATIONS

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A new method is proposed for solving nonlinear Fredholm integral equations. Sufficient conditions are found for the existence of a solution in the form of a finite sum.

Works of A.Liapunoff (1906), E. Schmidt (1908), P.Levy (1910), G. Bratu (1910), G. Bu[illegible] (1912), A. Gollet (1912), H.Gagajkian (1912) were a prerequisite for the development of the theory of nonlinear integral equations at the beginning of the last century. After these works, new research was developed in this direction by A. Hammerschtein, L. Lichtenstein, P. Uryson, [illegible] Iglisch, V. Nemytsky, and others. In the 1930s, the theory of non-linear integral equations was formulated. Since then, interest in non-linear integral equations has not weakened. In [3, 4], based on Lagrange's formula "on finite increments," a new method has been developed that makes it possible to find solutions of nonlinear integral Fredholm equations in the form of a sum of two functions, and conditions are found for the uniqueness of such solutions.

Consider the nonlinear integral equation

$$\phi(x) = \lambda \int_a^b \sum_{i=1}^{n} \alpha_i(x)\beta_i(t,\phi(t))dt + f(x), \tag{1}$$

where $\alpha_1(x),\dots,\alpha_n(x)$ and $\beta_1(t,\phi(t)),\dots,\beta_n(t,\phi(t))$ are mutually linearly independent given functions. By the Lagrange formula "on finite increments", sufficient conditions are found. for the solvability of nonlinear Fredholm integral equation (1)

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and their skillful use in practice help the teacher to understand regularities and interrelations of the phenomena of public life, message the reasoned polemic with opponents, to evidential defend true judgments. Therefore studying of traditional logic course has to precede studying of any concrete science or a high school subject matter. Ideally the course of logic has to become obligatory a subject for all averages educational institutions (high schools, lyceums, gymnasiums, technical schools, normal schools of SPTU, etc.).

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APPROXIMATE SOLUTION OF NONLINEAR OPTIMIZATION PROBLEM WITH A MOVING POINT CONTROL OF THE THERMAL PROCESS

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The convergence of the approximate solution of the optimal control problem is investigated for thermal processes described by Fredholm integro-differential equations when the heat conduction occurs under the influence of a point mobile source .

Consider the problem of minimizing the generalized quadratic functional

$$I[u(t)] = \int_0^1 [v(T,x) - \xi(x)]^2 dx + \beta \int_0^T p^2[t,u(t)]dt, \quad \beta > 0$$

on the set of solutions to boundary value problem

$$v_t = v_{xx} + \lambda \int_0^T K(t,\tau) v(\tau,x) d\tau +$$

$$+\delta(x - x_0(t)) f[t,u(t)], \quad x \in (0,1), \ 0 < t \leq T,$$

$$v(0,x) = \psi(x), \ x \in (0,1), \quad v_x(t,0) = 0, \ \ v_x(t,1) + \alpha v(t,1) = 0, \ 0 < t \leq T.$$

where $K(t,\tau)$ is a given function, it is defined in region $D = \{0 \leq t \leq T, 0 \leq \tau \leq T\}$ and $K(t,\tau) \in H(D)$; $\xi(x) \in H(0,1)$, $\psi(x) \in H(0,1)$ are given functions; $f[t,u(t)] \in H(0,T)$ is specified externa[l] source function, which nonlinearly dependent on the control function $u(t) \in H(0,T)$ and satisfie[s] the con...