

Piotr Drygaś, Vladimir Mityushev,
Barbara Sobek, Mirosława Zima (Eds.)

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Abstracts

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Editors

Piotr Drygaś
Vladimir Mityushev
Mirosława Zima
Barbara Sobek

Faculty of Mathematics and Natural Sciences
University of Rzeszów
Rzeszów
Poland

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Immersion principle for boundary value problem for ordinary differential equations

Serikbai Aisagaliev, Zhanat Zhunussova

Al-Farabi Kazakh National University, Almaty, Kazakhstan
e-mails: Serikbai.Aisagaliev@kaznu.kz, zhzhkh@mail.ru

A constructive solution method for boundary problem for ordinary differential equation is supposed on the base of constructing a general solution of the Fredholm integral equation of the first kind. We consider the following boundary value problem

$$\dot{x} = A(t)x + B(t)f(x, t) + \mu(t), t \in I = [t_0, t_1], \quad (1)$$

with boundary conditions $(x(t_0), x(t_1)) \in S \subset R^{2n}$ and phase restrictions $x(t) \in G(t) : G(t) = \{x \in R^n | \gamma(t) \leq F(x, t) \leq \delta(t), t \in I\}$, where $A(t), B(t)$ are prescribed matrixes with piecewise-continuous elements of the orders $n \times n, n \times m$ correspondingly, $\mu(t), t \in I$ is prescribed n -dimensional vector-function with piecewise-continuous components, $f(x, t)$ is m -dimensional vector-function, defined and continuous by variables $(x, t) \in R^n \times I$ and satisfied to the conditions: $|f(x, t) - f(y, t)| \leq l|x - y|, \forall (x, t), (y, t) \in R^n \times I, l = \text{const} > 0, |f(x, t)| \leq C_0|x| + C_1(t), C_0 = \text{const} \geq 0, C_1(t) \geq 0, C_1(t) \in L_1(I, R^1)$. Here S are prescribed convex closed sets. The problem is formulated: Find necessary and sufficient conditions for existing a solution of the problem (1).

1. A. N. Tikhonov, A. B. Vasileva, A. G. Sveshnikov, *Differential equations*, - M.: Science, 1985, p. 231.
2. S. A. Aisagaliev, *General solution of a class integral equations*, Mathematical Journal, Institute of Mathematics MES RK 5 (2005), 7-13.