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

The 3rd International Workshop

Boundary Value Problems, Functional Equations and Applications

Rzeszów, Poland, April 20-23, 2016
Abstracts

University of Rzeszów

Editors

Piotr Drygaś
Vladimir Mityushev
Mirosława Zima
Barbara Sobek

Faculty of Mathematics and Natural Sciences
University of Rzeszów
Rzeszów
Poland

ISBN 978-83-7996-267-9

Cover design: Magdalena Rej and Łukasz Kuśnierz under the supervision of Karolina Niwelińska – Faculty of Art, University of Rzeszów

Table of Contents

I Plenary Lectures

II Contributed talks

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

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

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: $|f(x,t) - f(y,t)| \leq l|x-y|, \forall (x,t), (y,t) \in R^n \times I, l = const > 0$, $|f(x,t)| \leq C_0|x| + C_1(t), C_0 = const \geq 0, C_1(t) \geq 0, C_1(t) \in L_1(I, R^1)$. 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.