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IVAN FRANKO LVIV NATIONAL UNIVERSITY
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WESTERN SCIENTIFIC CENTER OF NAS AND MES OF UKRAINE

XI INTERNATIONAL SKOROBOHATKO MATHEMATICAL CONFERENCE

(October 26 – 30, 2020, Lviv, Ukraine)

ABSTRACTS

Lviv – 2020

Abstracts of XI International V.Skorobohatko Mathematical Conference are published. The new results in a few branches of mathematics relevant to interests of Prof. Vitaliy Skorobohatko (1927-1996) are presented. Tasks in the fields of ordinary differential equations and differential equations with partial derivatives are considered, problems in function theory, functional analysis, algebra and computational mathematics are analyzed. A number of applications to problems in mathematical physics and mechanics are developed.

Approved for publication by the Academic Council of Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, National Academy of Sciences, Ukraine (prot. 7, 1.10.2020)

First page: portrait of V.Skorobohatko

ISBN 978-966-02-9390-8 (electronic publication)

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CONSTRUCTIVE EXISTENCE ANALYSIS OF SOME NON-LINEAR INTEGRAL BVPS

We consider the following non-linear integral boundary value problem

$$\frac{du(t)}{dt} = f\left(t, u(t), \frac{du(t)}{dt}\right), \quad t \in [a,b], \tag{1}$$

$$\int_a^b g(s, u(s), u'(s))ds = d. \tag{2}$$

Here we suppose that the functions f: $[a,b] \times D \times D' \to \mathbb{R}^n$, g: $[a,b] \times D \times D' \to \mathbb{R}^n$ are continuous and satisfy the Lipschitz condition in the domain D and d is a given vector. Let D_a and D_b be a convex subsets of $\mathbb{R}^n$ where one looks for respectively the initial value $x(a)$, and the value $x(b)$ of the solution of the boundary value problem (1), (2).

The problem is to find and establish the existence of a continuously differentiable solution x: $[a,b] \to D$ of the problem (1), (2) with initial value $x(a) \in D_a$.

We note, that the domain D will be defined by using convex linear combinations of subsets D_a and D_b. We introduce the vectors of parameters $z = \mathrm{col}(z_1, ..., z_n)$, $\eta = \mathrm{col}(\eta_1, ..., \eta_n)$ and now, instead of integral problem (1), (2) we will consider the following "model-type" two-point boundary value problem with separated parameterized conditions: $\frac{du(t)}{dt} = f\left(t, u(t), \frac{du(t)}{dt}\right)$, $t \in [a,b]$, $x(a) = z$, $x(b) = \eta$.

We connect the introduced model type problem with the special parameterized sequence of function $x_m(t,z,\eta)_{m=0}^{\infty}$, satisfying the boundary conditions $x(a) = z$, $x(b) = \eta$ for all $z, \eta \in \mathbb{R}^n$. We prove the uniform convergence of the sequence of functions: $x_\infty(t,z,\eta) = \lim\limits_{m\to\infty} x_m(t,z,\eta)$.

1. Ronto A., Ronto M., Varha Y. A new approach to non-local boundary value problems for ordinary differential systems, *Applied Mathematics and Computation*, **250** (2015), 689–700.