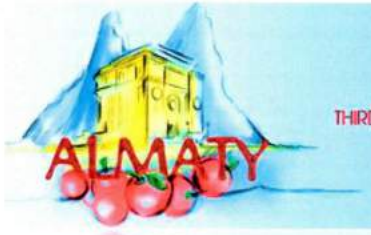
Third International Conference on Analysis and Applied Mathematics

ICAAM 2016

THE ABSTRACT BOOK



ICAAM 2016

THIRD INTERNATIONAL CONFERENCE ON ANALYSIS AND APPLIED MATHEMATICS
Institute of Mathematics and Mathematical Modelling

September 7-10, 2016, Almaty, Kazakhstan

07-10 September 2016

Institute of Mathematics and Mathematical Modelling
Almaty, Kazakhstan

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THE ABSTRACT BOOK

Institute of Mathematics and Mathematical Modeling

Editor:
Allaberen Ashyralyev

07-10 September 2016

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The conference is organized biannually. Previous conferences were held in Gumushane, Turkey in 2012 and in Shymkent, Kazakhstan in 2014.

The aim of the International Conference on Analysis and Applied Mathematics (ICAAM) is to bring mathematicians working in the area of analysis and applied mathematics together to share new trends of applications of mathematics. In mathematics, the developments in the field of applied mathematics open new research areas in analysis and vice versa. That is why, we plan to found the conference series to provide a forum for researches and scientists to communicate their recent developments and to present their original results in various fields of analysis and applied mathematics.

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Conference Sections and Minisymposiums :

- Analysis
- Applied Mathematics
- Mathematics Education
- Other Topics (Algebra, Geometry, Topology...)
- Minisymposium:Mathematical Modelling
- Minisymposium:Spectral Theory of Differential Operators
- Minisymposium:Dynamical Systems

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FOREWORD

The Organizing Committee of ICAAM and Institute of Mathematics and Mathematical Modelling are pleased to invite you to the Third International Conference on Analysis and Applied Mathematics, ICAAM 2016. The meeting will be held on September 7-10, 2016 in Almaty, Kazakhstan. This conference is dedicated to 70th birthday of Prof. Tynysbek Kalmenov.

The conference is organized biannually. Previous conferences were held in Gumushane, Turkey in 2012 and in Shymkent, Kazakhstan in 2014. The proceedings of ICAAM 2012 and ICAAM 2014 were published in AIP (American Institute of Physics) Conference Proceedings. Institute of Mathematics and Mathematical Modelling is pleased to host the third conference which is focused on various topics of analysis and its applications, applied mathematics and modeling.

The conference will consist of plenary lectures, mini symposiums and contributed oral presentations. The proceedings of ICAAM 2016 will be published in AIP (American Institute of Physics) Conference Proceedings. Selected full papers of this conference will be published in peer-reviewed international journals:

- FILOMAT (Science Citation Index),
- BOUNDARY VALUE PROBLEMS (Science Citation Index),
- CONTEMPORARY ANALYSIS AND APPLIED MATHEMATICS.

The aim of the International Conference on Analysis and Applied Mathematics (ICAAM) is to bring mathematicians working in the area of analysis and applied mathematics together to share new trends of applications of mathematics. In mathematics, the developments in the field of applied mathematics open new research areas in analysis and vice versa. That is why, we plan to found the conference series to provide a forum for researches and scientists to communicate their recent developments and to present their original results in various fields of analysis and applied mathematics. The Conference Organizing Committee would like to thank our sponsors. The main organizer of the conference is Institute of Mathematics and Mathematical Modelling, Almaty, Kazakhstan. The conference is also supported by Al-Farabi Kazakh National University, Almaty and L. N. Gumilyov Eurasian National University, Astana, Kazakhstan. We would like to thank Institute of Mathematics and Mathematical Modeling, Al-Farabi Kazakh National University and L. N. Gumilyov Eurasian National University for their support. We alsa would like to thank to all invited speakers, International Organizing Committee, International Organizing Committe, and Technical Program Committee Members. With our best wishes and warm regards,

Chairs:

Prof. Allaberen Ashyralyev

Prof. Mukhtarbay Otelbaev

6 MS2:SPECTRAL THEORY OF DIFFERENTIAL EQUATIONS 261

Spectrum of Volterra integral operator of the second kind

Meiramkul AMANGALIYEVA [1], Muvasharkhan JENALIYEV [1], Madi ERGALIYEV [1], Murat RAMAZANOV [2]

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Abstract: In this paper we consider the singular Volterra integral equation with spectral parameter $\lambda \in \mathbb{C}$ of form

$$\varphi(t) - \lambda \int_0^t K(t,\tau)\,\varphi(\tau)\,d\tau = f(t), \quad t > 0, \tag{1}$$

where

$$K(t,\tau) = K^{(1)}(t,\tau) + K^{(2)}(t,\tau), \tag{2}$$

$$K^{(1)}(t,\tau) = \frac{1}{2a\sqrt{\pi}} \cdot \frac{t^{\omega} + \tau^{\omega}}{(t-\tau)^{\frac{3}{2}}} \exp\left(-\frac{(t^{\omega}+\tau^{\omega})^2}{4a^2(t-\tau)}\right), \tag{3}$$

$$K^{(2)}(t,\tau) = \frac{1}{2a\sqrt{\pi}} \cdot \frac{t^{\omega} - \tau^{\omega}}{(t-\tau)^{\frac{3}{2}}} \exp\left(-\frac{(t^{\omega}-\tau^{\omega})^2}{4a^2(t-\tau)}\right), \ \omega\, 1/2. \tag{4}$$

We call such equations as the Volterra integral equations with 'incompressible' kernel [1]. It is shown that the corresponding homogeneous equation on $|\lambda| \geq \exp\{|\arg\lambda|\}$, $\arg\lambda \in [-\pi, \pi]$ has a continuous spectrum, and the multiplicity of the characteristic numbers grows with increasing $|\lambda|$. We use the Carleman-Vekua regularization method. We introduce the characteristic integral equation. We prove that the initial integral equation has eigenfunctions, the multiplicity of which depends on the value of the spectral parameter λ. We prove the solvability theorem of the nonhomogeneous equation (1)–(4) in a case when the right-hand side of the equation belongs to a certain class.

Keywords: Volterra integral equation, spectrum, eigenfunction

2010 Mathematics Subject Classification: 45C05, 45D05, 45E10

References:

[1] M.T. Jenaliyev, M.M. Amangaliyeva, M.T. Kosmakova, and M.I. Ramazanov, "On a Volterra equation of the second kind with 'incompressible'", *Advances in Difference Equations*, Vol. 2015:71 (2015). 14p.