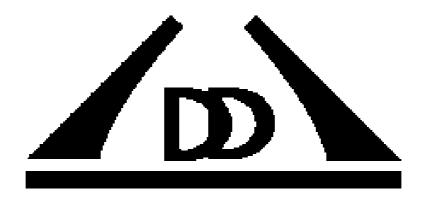
PROCEEDINGS of the International Conference



DAYS on DIFFRACTION 2009

May 26 – 29, 2009 St.Petersburg, Russia Proceedings of the International Conference "Days on Diffraction" 2009 May $26-29,\,2009,\,$ St.Petersburg, Russia

edited by $\,$ I. V. Andronov

A. P. Kiselev M. V. Perel A. S. Kirpichnikova University of St.Petersburg Mathematical Institute University of St.Petersburg University of Edinburgh, UK

The conference is sponsored by



Russian Foundation for Basic Research



 $\begin{array}{c} {\rm IEEE~ED/MTT/AP} \\ {\rm St.Petersburg~Chapter} \end{array}$



Russian Academy of Sciences

IEEE Catalog No.: CFP09489-PRT

ISBN: 978-5-9651-0358-4

© Days on Diffraction Faculty of Physics, SPbU 2009

PREFACE

The International Conferences "Days on Diffraction" are annually held by the Faculty of Physics of St.Petersburg University, St.Petersburg Branch of V.A. Steklov Mathematical Institute and Euler International Mathematical Institute of the Russian Academy of Sciences.

Approximately 140 scientists from all over the world took part in the "Days on Diffraction - 2009" Conference. The Organizing Committee is thankful to all the participants. We appreciate their presentations which have been made during plenary, parallel and poster sessions. Our special gratitude is to the authors of 36 papers selected for publication in the *Proceedings* for preparation of their manuscripts in accordance with the required rules.

The Organizing Committee

Organizing Committee

Prof. V.M. Babich	St.Petersburg	Dr. A.S. Kirpichnikova (secretary),
Prof. V.S. Buldyrev	St.Petersburg	Prof. I.V. Andronov,
Prof. V.N. Troyan	St.Petersburg	Prof. N.Ya. Kirpichnikova,
Prof. V.P. Smyshlyaev	UK	Prof. M.A. Lyalinov,
Prof. R. Stone	USA	Dr. E.V. Novikova,
Dr. N. Zhu	Germany	Ya. Shibaeva,
Dr. M.V. Perel	St.Petersburg	N. Zalesskaya,
Prof. A.M. Samsonov	St.Petersburg	Prof. A.P. Kiselev

Address:

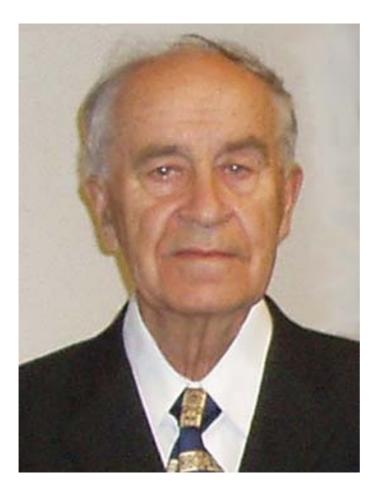
Prof. V.M. Babich
Prof. I.V. Andronov

Web site

babich@pdmi.ras.ru
iva---@list.ru

http://eimi.imi.ras.ru/ dd/index.php

80 years to professor V. S. Buldyrev



This year we celebrated the 80-th anniversary of Vladimir Sergeevitch Buldyrev - the eminent scientist in the field of mathematical theory of wave phenom-The progress in science would be impossible without scientific schools which in its term need "condensation centers". As an example professor G. I. Petrashen could be nominated as such center in the 50-ies. Later on this role had moved to younger researches among whom was Vladimir Sergeevitch Buldyrev. Vladimir Sergeevitch had been a remarkable organizer of science: more than twenty of his pupils got their doctoral degree and six of them became professors, the initiation of "Diffraction Days" is strongly binded with his name.

He was the author and coauthor of many pioneering articles and books of mathematical theory of diffraction. He had been awarded by State Prize and St.-Petersburg university Prize

Study of "whispering gallery" and "jumping ball" modes led Vladimir Sergeevitch to the notion of stability of rays in the first approximation and to elaboration of the so-called "infinitesimal ray method". Together with boundary layer approach originated by V. A. Fock these studies open a new epoch in diffraction theory which is continuing up to nowadays. In the papers of V. S. Buldyrev his "analytical might" is striking. He wrote four textbooks and monographs. Most of them appeared in English and Russian. They are well-known by students and scientists.

Beyond scientific activity Vladimir Sergeevitch with his wife Aida Andreevna and with his friends climbed many mountains, paddled down several rivers and travelled in many winter ski tours.

We wish Vladimir Sergeevitch new successes and mainly good health.

CONTENTS

Eron L. Aero, Anatolii N. Bulygin, Yurii V. Pavlov
A new approach to solution of generalized (3+1)-dimensional sine-Gordon equation
S. Albeverio, V. M. Shelkovich Algebraic aspects of multidimensional δ -shocks and singularities of flux-functions
Mikhail V. Altaisky, Elena A. Popova, Denis Yu. Saraev Application of orthogonal wavelets for the stochastic wavelet-Galerkin solution of the Kraichnan-Orszag system
Atul Bhaskar Wave speed-porosity scaling for cellular solids
Amira Bensouissi, A. Ifa, M. Rouleux Andreev reflection and the semiclassical Bogoliuobov-De Gennes hamiltonian
Bogomolov Ya.L., Kashitsyn R.V. , Yunakovsky A.D. 2-D Nonlinear Schroedinger Equation. Numerical Aspects
V. V. Borzov, E. V. Damaskinsky Connection between representations of Heisenberg and $su(1,1)$ algebras
Victor V. Borisov Transient waves in dispersive media: a case of moving planar sources with Gaussian transverse distribution
N. Dalarsson, M. Dalarsson, P. Tassin, Z. Jaksic General Analytical Treatment of the Graded Interfaces with Negative-Index Nanocomposites 56
Alexandr S. Slusarenko, Galina N. Dyakova
Metrological aspects of computer based measurement systems in radionavigating complexes 63
Victor G. Farafonov, Vladimir B. Il'in, Alexander A. Vinokurov, Elena V. Leksachenko On applicability of the extended boundary condition method with the spheroidal basis
S. N. Galyamin, T. Yu. Alekhina, A. V. Tyukhtin, E. G. Doil'nitsina Radiation of a charge passing from vacuum into the left-handed medium
Georgi Nikolov Georgiev, Mariana Nikolova Georgieva-Grosse The $Z(c,n)$ numbers and their application in the theory of waveguides76
Leonid I. Goray, Gunther Schmidt
An integral-equation conical solver: some formulas and numerical experiments92
Vladimir B. Il'in, Victor G. Farafonov, Alexander A. Vinokurov, Vladimir I. Ustimov Light scattering problem solutions using the field expansions in wave functions: convergence and the Rayleigh hypothesis
Natalia E. Kaputkina, Mikhail V. Astakhov Absorption and shape transformation of pulse of electromagnetic radiation due to interaction with nanoparticle materials
A. A. Korshunova, O. S. Rozanova The Riemann problem for the stochastically perturbed non-viscous Burgers equation and the pressureless gas dynamics model
Daniil P. Kouzov, Yulia A. Solovyeva
Diffraction of a plane wave with an amplitude linearly varying along its front on a rigid semi-
infinite screen
Damage hazard prediction while drilling

Speaker is given in bold.

Aleksey A. Kudreyko
Application of circular harmonic wavelets towards solution of the Fredholm type integral equa-
tions
Alexander V. Kudrin, Evgeny Yu. Petrov, Tatyana M. Zaboronkova Electrodynamic characteristics of a strip antenna in a resonant anisotropic medium
A.G. Kyurkchan, N.I. Smirnova Solution of diffraction problems by null field and T-matrix methods with accounting for wave field analytical continuation singularities
Vladimir Yu. Lotoreichik, Igor S. Lobanov, Igor Yu. Popov, Jussi Behrndt Counting eigenvalues of Schrödinger operator with δ -potential supported by loop
Peter G. Malischewsky Connections between seismology, waveguide physics and quantum mechanics
German A. Maximov
Account of resonance relaxation in the framework of double phase continuum mechanics 15
Rayisa P. Moiseyenko, Valeriy I. Storozhev
Antiplane wave scattering on tunnel cylindrical cavities with fixed inclusions of radial cross-section in orthotropic body
Maria V. Perel
Integral representation of solutions of the wave equation based on Poincaré wavelets 15
Alexandr B. Plachenov , Vyacheslav N. Kudashov, Anatoliy M. Radin Modes of two-mirror cavity with non-coinciding main curvature directions
Ekaterina S. Trifanova, Igor Yu. Popov
Asymptotics of resonances for curved coupled waveguides
Alexander I. Slepkov, Olga V. Gallyamova On features of Smith-Purcell radiation resonant regimes in relativistic diffraction generator17
A. Torre
Separable-variable solutions of the wave equation from a general type of solutions of paraxial wave equation
Alexander I. Trifanov, George P. Miroshnichenko, Igor Yu. Popov Three qubit operation in the five level optical medium
Andrei B. Utkin
Undistorted progressive waves resulting from separation of variables in some orthogonal curvilinear coordinate systems
Aleksander G. Demidov, Evgeny Yarevsky Adaptive finite element method based on superconvergence
N. F. Yashina, T. M. Zaboronkova Instability of the electromagnetic surface waves supported by the plasma column20
D. Yu. Zaika, M. V. Perel, I. V. Andronov The interaction of creeping waves on a smooth anisotropic impedance surface
Author index