FOREWORD

DOI: https://doi.org/10.17466/tq2017/21.2/0

The international workshop on *Waves in Inhomogeneous Media and Integrable Systems* was held at the Gdansk University of Technology from 20 to 22 September 2016. This was the sixth annual meeting in Gdansk, continuing the cooperation of physicists and mathematicians from neighboring countries.

It is a continuation of the tradition of meetings of scientists from Gdansk and Koenigsberg. The conference was traditionally devoted to the linear and nonlinear wave theory. It focused on waves in stratified and heterogeneous media with special attention to the mathematical methods of description of wave propagation and the associated phenomena.

Among these methods we may list reduction of general hydrodynamic and electrodynamic systems of equations into simplified model equations which are specified by boundary and initial conditions. Subsequently, these reduced systems can be solved approximately in agreement with the physical meaning and statement of a problem.

A good few of the conference attendants advanced the modeling of waves in ocean and atmosphere.

Some important contributions to this field were reported at the previous workshops. In particular, we may mention the results by S. Dobrokhotov from Moscow (Ishlinsky Institute for Problems in Mechanics of the Russian Academy of Sciences) which were discussed by the author in a talk on a finite amplitude waves oncoming and running back at the seashore.

The report was entitled *Exact and asymptotic solutions to shallow water equations with degenerating velocity* and included evaluations of the complicated wave dynamics which were modeled and illustrated by compact, exact and asymptotic formulas.

An important position among the model equations is occupied by the integrable equations. The theory of integrable systems was developed by Bernacka, Pavlov, Sergyeyev, Prykarpatski, Yurov. For different reasons, not all the reports are represented in this volume. The following list of all lectures exhibits a wide domain of interests of the participants:

1. Ivan Karpov (Kaliningrad), *Ionospheric disturbances initiated by meteorological disturbances.*
2. Olga Borchevkina (Kaliningrad), *Influence of strong meteorology storms on ionosphere parameters.*
3. Anna Perelomova (Gdansk), *Excitation of non-wave modes by sound of arbitrary frequency in a chemically reacting gas.*
4. Sergey Kshevetskii, Yuliya Kurdyaeva (I, II) (Kaliningrad), *A boundary value problem of the wave propagation from variable pressure on the Earth's surface and the meteorological sources of waves in the atmosphere.*
5. Dmitry Ampilogov (Kaliningrad) *Interaction of electromagnetic polarization modes in metamaterials. Stationary solutions in elliptic functions.*
6. Monika Pietrzyk (St Andrews) *Unconditional stability of the polysymplectic integrator for Short Pulse Equation.*
7. Grzegorz Kwiatkowski (Gdansk) *Green function construction through Moutard transform.*
8. Julia Bernatska (Kyiv) *Nonlinear waves via Abelian functions in high genera.*
9. Maxim Pavlov (Novosibirsk) *Associativity equations as a high frequency limit.*
10. Anatolij Prykarpatski (Krakow) *The Hamilton operators and related integrable Novikov-Leibniz differential-algebraic structures.*
11. Artur Sergyeyev (Opava) *Infinitely many nonlocal conservation laws for the ABC equation with* $A+B+C \neq 0$.
12. Nadezhda Bazunova (Tallinn) *Universal differential calculus on ternary algebras.*
13. Valerian Yurov (Kaliningrad) *The construction of exact solutions to the Cauchy problem for the generalized hyperbolic Novikov-Veselov equation.*
14. Alla Yurova (Kaliningrad) *Rogue waves for the Davey-Stewartson equation.*
15. Mikhail Vereschagin (Kaliningrad) *Investigation of domain wall dynamics in micro and nano wires using generalized complete integrable discrete Heisenberg chain model.*
16. Sergey Leble (Kaliningrad) *Kolmogorov equation in propagation problems and iteration series.*
17. Stepan Botman (Kaliningrad) *Electrical Resistivity Model for Quasi-one-dimensional structures.*
18. Sergey Vereschagin (Kaliningrad) *Usage of discrete projection operators in wave diagnostics.*
19. Irina Verschagina (Kaliningrad) *Diagnostics of entropy mode in the problem of propagation of acoustic waves.*

20. Pawel Wojda (Gdansk) *Comparison of the effectiveness of methods enabling simulations of the X-ray propagation through a system of many lenses.*

In addition to the above lectures a dozen of posters on similar subjects were presented. The list of all contributions reflects also the geographic spread of the participants, from the Czech Republic to Siberia.

A reader of TASK Quarterly will see many results on various wave phenomena, starting with fluid flows (Kshevetskii, Perelomova, Yurova, I. Vereschagina, S. Vereschagin) ending with electromagnetic waves and X-rays (Botman, Wojda). They are complemented by reports on wave theories which generalize the particular cases.

Gdansk, April 1, 2017

Anna Perelomova
Sergey Leble