

The International School–Conference “Sobolev Readings” was held from December 10 to December 16 in Novosibirsk. It continued a series of conferences dedicated to Sergei L’vovich Sobolev (1908–1989), the outstanding scientist of the 20th century, one of the founders of the Siberian Branch of the Academy of Sciences, Novosibirsk State University and Institute of Mathematics, which bears his name now. This year the school–conference was dedicated to the 110th anniversary of the birthday of S.L. Sobolev.

The Sobolev Institute of Mathematics of the Siberian Branch of the Russian Academy of Sciences and Novosibirsk State University were the organizers of the conference. The preparation and holding of the school–conference were realized with the support of the International Mathematical Union, Abdus Salam International Centre for Theoretical Physics, Russian Foundation for Basic Research, Siberian Branch of the Russian Academy of Sciences, and Regional Mathematical Center of Novosibirsk State University,.

The Opening Ceremony of the conference took place on December 10 in the Small Hall of the House of Scientists SB RAS. The ceremony began with the welcome speech of the Chairman of the Program Committee of the conference G.V. Demidenko. He noted that the conference is dedicated to the 110th anniversary of the birthday of Sergei L’vovich Sobolev, who made a huge contribution to the world mathematics and today's conference is a tribute to the great scientist.

At the beginning of his speech, G.V. Demidenko noted that the first School–Conference “Sobolev readings” was held in 2016 (December 18–22, 2016, Novosibirsk, Russia; <http://math.nsc.ru/conference/sobolev/readings/2016/english>). In 2017 the School–Conference was held for the second time immediately after the International Conference “Mathematics in the Modern World” dedicated to the 60th anniversary of the Sobolev Institute of Mathematics (August 14–19, 2017, Novosibirsk, Russia; <http://math.nsc.ru/conference/mmw/2017/en>). In 2018 the School–Conference “Sobolev Readings” was organized for the third time.

G.V. Demidenko said that more than 350 applications were submitted for participation in the school–conference, one third of which were from young scientists. He noted that the program of the school–conference has educational and scientific parts. The program is made so that in the morning the participants listen to the scientific–educational lecture courses, and in the afternoon – scientific talks of the participants. G.V. Demidenko noted that the lecturers are talented teachers and well–known mathematicians, and reminded that in 2016 the lecture courses were given by Corresponding Member of the RAS, Professor P.I. Plotnikov (Lavrentyev Institute of Hydrodynamics SB RAS, Novosibirsk State University, Novosibirsk, Russia), Professor E.V. Radkevich (Lomonosov Moscow State University, Moscow, Russia), and Professor A.L. Skubachevskii (RUDN University, Moscow, Russia); in 2017 the lecture courses were given by Professor E. Feireisl (Institute of Mathematics, Charles University, Prague, Czech Republic), Professor V.Z. Grines (National Research University “Higher School of Economics”, Nizhny Novgorod, Russia), and Professor V.G. Zvyagin (Voronezh State University, Voronezh, Russia). This year the leading scientists were invited to the school–conference with lecture courses: Professor S.N. Antontsev (University of Lisbon, Lisbon, Portugal) and Professor A. Guessab (Université de Pau et des Pays de l’Adour, Pau, France). On behalf of the Program Committee G.V. Demidenko expressed a gratitude to all lecturers for the fact that they found the opportunity to give lecture

courses at the School–Conferences “Sobolev Readings”.

G.V. Demidenko reminded that at the first School–Conference “Sobolev Readings” in 2016 it was decided that one of the lecture courses must be devoted to the works of S.L. Sobolev and such lecture should be given by a young scientist. At the same time, it was decided that in 2017 the lecture will be devoted to the first scientific work of S.L. Sobolev. The work was written by S.L. Sobolev in his student years. A brochure with the manuscript of the first scientific work of S.L. Sobolev (handwritten variant of the text) had been published by the beginning of the first School–Conference “Sobolev Readings”. Each of the participants of the first School–Conference received the published brochure as a gift. G.V. Demidenko said that, at the second School–Conference in 2017, two lectures on this manuscript of S.L. Sobolev were given by Dr. A.G. Checkkina (Lomonosov Moscow State University, Moscow, Russia), great–granddaughter of Sergei L’vovich Sobolev.

G.V. Demidenko reminded that, during the Opening Ceremony of the second School–Conference, it was announced that at the third School–Conference the lecture course by a young scientist would be devoted to the work of S.L. Sobolev “The wave equation for inhomogeneous medium” published in the Proceedings of the Seismological Institute in 1930. G.V. Demidenko said that the lecture course on this work was prepared by Dr. L.N. Bondar (Sobolev Institute of Mathematics, Novosibirsk, Russia), who would give it at this school–conference.

G.V. Demidenko said that a lecture course on the work of S.L. Sobolev “To a question on integration of the wave equation in inhomogeneous medium” published in the Proceedings of the Seismological Institute in 1934 should be prepared by the beginning of the next school–conference. He called it the new homework for young scientists to the next conference and called for active participation.

Finally, on behalf of the conference organizers G.V. Demidenko thanked the International Mathematical Union, Abdus Salam International Centre for Theoretical Physics, Russian Foundation for Basic Research, Siberian Branch of the Russian Academy of Sciences, and Regional Mathematical Center of Novosibirsk State University for the support in organizing and holding the school–conference.

At the Opening Ceremony of the conference on behalf of the Presidium of the Siberian Branch of the Russian Academy of Sciences (SB RAS), Deputy Chairman of the SB RAS academician V.M. Fomin made the welcome speech. He emphasized that results of S.L. Sobolev had a great influence not only on the world mathematics, but also on science in general. He recalled the decisive contribution of S.L. Sobolev to the creation of Akademgorodok. V.M. Fomin paid attention to the exceptional feature of the School–Conference “Sobolev Readings” – at each school–conference one lecture course is devoted to a work of S.L. Sobolev. This reminds everyone not to forget their teachers and helps young people understand what their predecessors did.

In his speech, academician Yu.L. Ershov, the Chairman of the United Scientific Council on Mathematician and Informatics of SB RAS, scientific advisor of the Sobolev Institute of Mathematics, recalled a major International Conference “Differential Equations. Function Spaces.

Approximation Theory” dedicated to the 100th anniversary of the birthday of S.L. Sobolev (October 5–12, 2008, Novosibirsk, Russia; <http://math.nsc.ru/conference/sobolev/100/english>). Just then, during the Evening of Remembrances about Sergei L’vovich Sobolev the idea of holding a School–Conference “Sobolev Readings” was expressed. Yu.L. Ershov emphasized the importance of such format as school–conferences. He noted that the creation of International Mathematical Centers in Russia are discussing, whose activities could be aimed, among other things, at holding such schools–conferences regularly.

At the Opening Ceremony of the school–conference the director of the Sobolev Institute of Mathematics, academician S.S. Goncharov gave a speech. He stressed that holding schools–conferences stimulates the development of research, helps to identify prospective problems and their applications. S.S. Goncharov reminded that last year the Institute of Mathematics celebrated the 60th anniversary of its foundation. The part of S.L. Sobolev was defining in the creation and development of the Institute. He arrived in Novosibirsk with his disciples and invited to Novosibirsk leading scientists such as A.D. Aleksandrov, A.V. Bitsadze, L.V. Kantorovich, M.I. Kargapolov, A.A. Lyapunov, A.I. Maltsev, and A.I. Shirshov. S.S. Goncharov emphasized that S.L. Sobolev was one of the founders of the Siberian Branch of the Academy of Sciences and Novosibirsk State University, at the opening of the latter S.L. Sobolev gave the first lecture. S.S. Goncharov wished all the participants of the school–conference to be worthy of this great man and scientist, as well as to work actively for the benefit of the country.

The welcome speech was addressed to the participants of the school–conference by Professor A. Laptev, President of the European Mathematical Society from 2007 to 2010, Director of the Mittag–Leffler Institute (Sweden; from 2011 to 2018). He emphasized that the Sobolev Institute of Mathematics plays a significant role in the world mathematics, and the term “Sobolev space” occurs in mathematics more often than others. He noted that Russia has always been famous for the level of development of mathematics, in particular, due to the fact that university professors seriously engage in the training of young people. He stressed the importance of holding school–conferences, wished the participants productive work, and wished the organizers success in supporting young mathematicians.

The Chairman of the Program Committee G.V. Demidenko conveyed to the participants of the school–conference the wishes of successful work from the rector of Novosibirsk State University, Corresponding Member of the RAS M.P. Fedoruk.

The organizers of the conference received a letter from the leadership of the International Society for Analysis, its Applications and Computation (ISAAC), which was read by G.V. Demidenko. In particular, in the letter it was noted: «Sobolev, one of most important scientists and mathematicians, was an example of concerning scientific, visionary, organizational and social development. We admire Sobolev's fundamental achievements and theories of extreme importance in different areas of mathematics. Results that often have received major applications in technology and science. His early interest in partial differential equations combined with ingenuity and intellectual brilliance quickly led to establishments of new functional spaces and theories, such as Sobolev spaces and distribution theory, which today are indispensable in modern mathematics, science and technology. We also admire his fundamental results in, for

example, spectral theory, computational mathematics, (multidimensional) interpolation theory and numerical methods/analysis... He was one of the first scientists who realized the importance of computational mathematics and cybernetics. We also appreciate his community commitment and good organizational skills, e.g. for the foundation of the big scientific center – the Siberian Division of the Academy of Sciences.»

At the end of the Opening Ceremony, G.V. Demidenko read a welcome letter from Tat'yana Sergeevna Soboleva, daughter of Sergei L'vovich, to the participants of the conference. In particular, she noted: "Sergei L'vovich gave a lot of time and effort to the training of scientific youth. He considered it as one of the most important affairs of his life. I am very pleased that the Institute of Mathematics and Novosibirsk State University pay great attention to the training of scientific youth. The confirmation of this is this school–conference, which has already become traditional." She wished the conference to be held in originative and creative atmosphere, to contribute to the development of scientific potential, to be a good school for young people.

Working sessions of the school–conference were held in the Small Hall of the House of Scientists SB RAS, in the conference hall and rooms of the Sobolev Institute of Mathematics and Novosibirsk State University. The conference was attended by more than 200 representatives from 16 countries: Brazil, China, France, Germany, United Kingdom, Hungary, Portugal, Republic of Armenia, Republic of Belarus, Republic of Kazakhstan, Republic of Tajikistan, Republic of Uzbekistan, Russia, Sweden, Ukraine, and USA. The geography of the conference participants was widely represented by Russian scientists from various cities – from Simferopol to Vladivostok.

During the school–conference three lecture courses were given:

1. Professor S.N. Antontsev (University of Lisbon, Lisbon, Portugal) «Evolution PDEs with nonstandard growth conditions» (3 lectures);
2. Professor A. Guessab (Université de Pau et des Pays de l'Adour, Pau, France) «Delaunay triangulation, Voronoi diagrams and applications» (3 lectures);
3. Dr. L.N. Bondar (Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia) «On the S.L. Sobolev's work "The wave equation for inhomogeneous medium"» (2 lectures).

At the conference well–known scientists gave plenary lectures about the latest achievements in mathematics and mechanics:

1. Anikonov D.S. (Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia) «Differential equations with discontinuous coefficients for the higher–order derivatives»;
2. Begehr H. (Free University of Berlin, Berlin, Germany) «Hierarchy of complex model operators – a unified approach to a theory of complex partial differential equations»;
3. Godunov S.K. (Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia), Klyuchinskiy D.V. (Novosibirsk State University, Novosibirsk, Russia), Fortova S.V. (Institute of Computer Aided Design RAS, Moscow, Russia) «An experimental investigation of discontinuous solutions to a linearized finite–difference model of gas dynamics with the property of nondecreasing of

entropy»;

4. Grines V.Z. (National Research University "Higher School of Economics", Nizhny Novgorod, Russia) «О топологической классификации структурно устойчивых каскадов на многообразиях»;
5. Kal'menov T.Sh., Arepova G.D. (Institute of Mathematics and Mathematical Modeling, Almaty, Republic of Kazakhstan) «Completeness of root vectors of regular boundary value problems for the Laplace equation»;
6. Karapetyan G.A., Petrosyan H.A. (Russian–Armenian University, Yerevan, Republic of Armenia) «Correct solvability of the Dirichlet problem in the half–space for regular equations»;
7. Khludnev A.M. (Lavrentyev Institute of Hydrodynamics SB RAS, Novosibirsk, Russia) «Parameter identification for thin inclusions located inside elastic bodies»;
8. Krisztin T. (University of Szeged, Szeged, Hungary) «Stable periodic orbits for the Mackey–Glass equation»;
9. Laptev A. (Imperial College London, London, United Kingdom; Institut Mittag–Leffler, Djursholm, Sweden) «Weyl type asymptotics and bounds for the eigenvalues of functional–difference operators for mirror curves»;
10. Malygina V.V. (Perm National Research Polytechnic University, Perm, Russia) «Asymptotic properties of solutions to linear functional–differential equations»;
11. Meirmanov A.M., Galtsev O.V. (Belgorod National Research University, Belgorod, Russia) «Mathematical models for nutrient transport and biological tissue growth»;
12. Nazarov A.I. (St. Petersburg Department of Steklov Mathematical Institute RAS, St. Petersburg, Russia) «Some inequalities for fractional Laplacians»;
13. Reshetnyak Yu.G. (Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia) «On S.L. Sobolev's results on the analysis and development of the theory of distributions at the Sobolev Institute of Mathematics»;
14. Sharafutdinov V.A. (Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia) «The Reshetnyak formula and generalized Sobolev spaces. Application to tensor tomography»;
15. Skubachevskii A.L. (RUDN University, Moscow, Russia) «The Kato square root conjecture for elliptic functional–differential operators»;
16. Stepanov V.D. (Steklov Mathematical Institute RAS, Moscow, Russia) «Characterization of associate function spaces».

The conference work was organized in the following sections:

- Section 1. Partial Differential Equations;
- Section 2. Differential Equations of Mathematical Physics;
- Section 3. Differential–Difference Equations;
- Section 4. Analysis and Related Questions.

In the talks at the section "Partial Differential Equations" various classes of partial differential equations were considered; in particular, parabolic and p–parabolic equations, elliptic and quasi–elliptic equations, Sobolev type equations, hyperbolic and pseudo–hyperbolic equations, mixed type equations, etc. For such equations, problems of solvability of boundary value problems, qualitative properties of solutions, asymptotic behavior, various formulations of inverse problems and methods of their solving were discussed.

In the talks at the section “Differential Equations of Mathematical Physics” various equations of mathematical physics were considered; in particular, equations of gas dynamics, system of equations of acoustics, system of Maxwell’s equations, system of Navier–Stokes equations, system of equations of elasticity, equations of dynamics of multi–velocity mixtures, Kelvin–Voigt equation, transfer equation, equation of dynamics of viscoelastic fluids with memory, etc. For such equations, there were discussed formulations of direct and inverse problems, methods of their solving; in particular, new methods for numerical solving.

In the talks at the section “Differential–Difference Equations” various ordinary differential and difference equations, delay equations, integro–differential equations, as well as modeling problems in biology, medicine, chemistry, electrodynamics were considered. The questions of stability and exponential dichotomy, qualitative properties of solutions, identification and control problems, as well as algorithms for numerical study of these issues were discussed.

In the talks at the section “Analysis and Related Questions” problems of approximation, problems of establishing relationships between different spaces, problems of harmonic analysis, optimal control problems, problems of constructing solutions to variational problems and operator equations, a problem of constructing optimal cubature formulas were discussed. Much attention was paid to the discussion of new results in the theory of function spaces.

At the Closing Ceremony of the school–conference in the evening on December 15 an informal exchange of opinions on the work done was held. It was noted that in the framework of the conference actual problems in the fields of differential equations, analysis, and computational mathematics were discussed. The conference contributed to the development of scientific cooperation and establishing new scientific contacts. A high level of the talks was noted, as well as active participation of young scientists in the work of the conference. Young participants of the conference had the opportunity to attend lectures of famous scientists and present their own results, which undoubtedly contributed to the development of their research potential. As a result of discussions, it was concluded of necessity of regular holding the School–Conference “Sobolev Readings”.

After the conference the organizers received many letters from the participants with words of gratitude. So, A. Laptev (Imperial College London, London, United Kingdom; Institut Mittag–Leffler, Djursholm, Sweden) wrote: “Many thanks for the fantastic conference. It was my great pleasure to attend it. It was very high quality.”; H. Begehr (Free University of Berlin, Berlin, Germany) wrote: “Thank you for your kind hospitality, the nice conference, your perfect, smooth and enjoyable organization with your very sympathetic young collaborators.”

Detailed information about the school–conference, including more than 800 photos, can be found at <http://www.math.nsc.ru/conference/sobolev/readings/2018/english>