

CURRICULUM VITAE

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Education

2011 - *D.Sc. in Math. (theoretical computer science)*: Dorodnicyn Computing Centre of Russian Academy of Sciences, Moscow, Russia

2003 - Nostrification of my Dr. degree as Dr.rer.-nat. at the University of Vienna

1976-1979 Computer Center of USSR Academy of Sciences (Moscow)

Ph.D. in Operations Research (discrete programming) (1979)

1968-1973 Moscow State University, mechanical-mathematical faculty

MSc in Mathematics (Mathematical modeling)

Thesis topic: "Mathematical modeling of fish schools".

Advisor - prof. S.V. Fomin

DISSERTATIONS

2011 - D.Sc. Thesis "Local elimination algorithms for sparse discrete optimization problems".

An analysis of the main graph structural decomposition algorithmic schemes (nonserial dynamic programming, local decomposition algorithms, tree decomposition) and their combination with combinatorial optimization techniques to develop effective algorithms for solving sparse real-world DO problems. New methodology using nonserial dynamic programming and tree decomposition combined with constraint satisfaction approaches for solving large-scale DO problems is analyzed and developed.

1979 "Investigation of some local algorithms for solving quasiblock problems of discrete programming."

A study of computational and theoretical aspects of decomposition algorithms in discrete programming. Estimates of complexity for local decomposition algorithms were analyzed theoretically. Algorithm was implemented using FORTRAN and benchmarking was done.

PROFESSIONAL EXPERIENCE

2008 - present Principal Investigator of the FWF Project "Graph Decomposition Approaches to Discrete Optimization".

2005 - 2008 Principal Investigator of the FWF Project "Global Optimization Approaches to Combinatorial Optimization. Visiting Professor at the Institute for Mathematics at the University of Vienna. Teaching courses on Decomposition in Optimization.

2004 – 2005 Visiting Professor at the Institute for Mathematics at the University of Vienna Teaching courses on Combinatorial Optimization.

2001 - 2004 Research Fellow at the Institute for Mathematics at the University of Vienna (global optimization research group). Development of new high-quality software for global optimization. EU project "COCONUT", IST-2000-26063. COCONUT is an IST Project funded by the

European Union. Its goal is to integrate the currently available techniques from mathematical programming, constraint programming, and interval analysis into a single discipline, to get algorithms for global optimization and continuous constraint satisfaction problems that outperform the current generation of algorithms based on using only techniques from one or two of the traditions.

1999 - 2001 Associated professor, the Crimean Academy of Ecoprotective Building (Ukraine). Teaching courses in operations research, mathematical modeling, computer science, computer-aided data analysis for economists.

1993 - 1999 Head of private scientific firm "Gradient" (Ukraine). Supervision of development of mathematical models and software.

1990 - 1993 Research fellow, the Institute of Automation of Design (ICAD) of Russian Academy of Sciences (Moscow). Modeling of real socio-economical systems. The resulting models of mixed integer programming were formulated and optimization algorithms were developed and implemented.

1977 - 1990 Assistant, senior scientific fellow, Associated Professor, Simferopol University. Courses: Operations Research, Probability Theory, Analysis.

1976 - 1977 Preparing Ph.D. thesis in Computer Center of the USSR Academy of Sciences , Moscow, advisor - academician Zhuravlev Yu.I.

1973 - 1976 Assistant of faculty of applied mathematics of the Simferopol University. Courses: Operations Research, Optimization Theory and Mathematical Modelling .

TEACHING AND RESEARCH INTERESTS

Operations research, mathematical modelling, discrete optimization, decomposition, nonserial dynamic programming, postoptimization analysis, modeling of recreational systems, algebraic modeling languages

SCIENTIFIC ACTIVITY.

Publications: I have 120 published works, including a monograph "Optimization of Recreational Activity" and a manual on mathematical programming.

Supervision of PhD STUDENTS: I was an advisor of 3 PhD students which defended their dissertations:

1. V.V.Matveyev „Investigation of some local algorithm for integer programming problems“ – 1985, Moscow, Computer Center of USSR Academy of Sciences, Referees: Prof. V.A.Emelichev (Minsk), Dr. Ju.Zuev (Computer Center of USSR Academy of Sciences). PhD in Operations Research – 1985.

2. A.I.Bashta „Economical-Mathematical models in Management of Recreational System and Problems of Autotourism Optimization” – 1988, Kiev, Institute for Economics. Referees: Prof. O.P.Suslov (Kiev), Dr. V.I. Khizhnjak (Kiev). PhD in Mathematical Economics – 1988.

3. N.N. Kanaeva – „Investigation of local algorithms for solving block Boolean programming problems“. - 2000, Dnepropetrovsk, University. Referees: Prof. O.A.Emec (Poltava), Dr. I.V. Grebennik (Kharkov). PhD in Operations Research – 2000.

Reviewer for international journals, such as *INFORMS Journal of Computing*, *CONSTRAINTS*, *SIAM Journal on Optimization*, *Journal of Universal Computer Science*, *International Journal of Production Economics*, *Optimization Methods and Software*, *Dynamic Systems (Ukraine)*, *Tavrian Herald of Informatics and Mathematics*.

Research results including patents, publications, teaching etc., taking into account the level of experience

SCIENTIFIC PUBLICATIONS FROM THE PAST SIX YEARS

1. Arnold Neumaier, Oleg Shcherbina, Waltraud Huyer, Tamas Vinko. A comparison of complete global optimization solvers. *Math. Programming B*, 2005, v. 103, p. 335-356.
2. O. Shcherbina. On nonserial modification of local decomposition algorithm, *Dynamic Systems*, 2005, 19, p. 179-190.
3. A. Saraev, O. Shcherbina. System analysis and modern information technologies, *Scientific Works of the Crimean Academy of Sciences*, Simferopol, 2006, p. 47-59.
4. V. Nikolsky, A. Ryzhakov, O. Shcherbina. Principles of development of model-based computer system of recreational systems research, *Dynamic Systems*, 2005, 19, p. 152-160.
5. A. Ryzhakov, O. Shcherbina, V. Nikolsky. *Mathematical Programming (Lecture Notes)*. Simferopol, 2005. 264 p.
6. V. Matveyev, V. Titarenko, O. Shcherbina. Modern computational Internet possibilities for solving optimization problems, *Building and Technosecurity*, 2005, 10, p. 227-232.
7. A. Saraev, O. Shcherbina. System approach, system analysis and newest information technologies. *Ibid*, 2005, 12, p. 156-163.
8. A. Neumaier, O. Shcherbina. Nonserial dynamic programming and local decomposition algorithms in discrete programming, *Discrete Optimization* (submitted). Available online: http://www.optimizationonline.org/DB_HTML/2006/03/1351.html
9. O. Shcherbina. Nonserial dynamic programming and tree decomposition in discrete optimization, *Applied Optimization and Metaheuristic Innovations (Abstracts of Int. Conference, Yalta, July 19-21, 2006)*, 2006, p.45-46.
10. O. Shcherbina. Elimination decomposition algorithms of discrete optimization problems, *Tavrian Herald of Informatics and Mathematics*, 2006, N 2, p. 28-41.
11. O. Shcherbina. Local algorithms and tree decomposition. *Dynamic Systems*, 2006, 20, p. 89-103.
12. A. Ryzhakov, O. Shcherbina. Modern problems of mathematical modelling in operations research, *Dynamic Systems*, 2006, 21, p. 115-129.
13. O. Shcherbina. Nonserial dynamic programming and tree decomposition in discrete optimization, *Proceedings of Int. Conference on Operations Research "Operations Research 2006"* (Karlsruhe, 6-8 September, 2006), Springer Verlag, 2007, p.155-160.
14. O. Shcherbina. Elimination local algorithms for constraint satisfaction problems. *Tavrian Herald of Informatics and Mathematics*, 2007, N 1.
15. O. Shcherbina. Local elimination algorithms in discrete optimization. *Proceedings of International conference "Scheduling and decomposition techniques"*, 28.03.2007, Minsk, 2007.
16. O. Shcherbina. Tree decomposition in discrete optimization (a survey), *Cybernetics and Systems Analysis*, 2007, N4. Available online: <http://www.springerlink.com/content/n6w880rw24513433/?p=50c98ca390f3487fa0d01ff9927c67d6&pi=7>
17. O. Shcherbina. Local elimination algorithms for solving sparse discrete problems, *Computational Mathematics and Mathematical Physics*, 2008, Vol. 48, p. 152-167.
18. O. Shcherbina. The role of graph structures in theory of local elimination algorithms, *Dynamic Systems*, 2008, N 24.
19. O. Shcherbina. Graph-Based Local Elimination Algorithms in Discrete Optimization. / In: *Foundations of Computational Intelligence Volume 3. Global Optimization Series: Studies in*

Computational Intelligence, Vol.203 / Abraham A.; Hassanien A.-E.; Siarry P.; Engelbrecht A. (Eds.). Springer Berlin / Heidelberg. 2009, XII, 528 p. P. 235-266.

20. O. Shcherbina. Tree decomposition and postoptimality analysis in discrete optimization, arXiv:0903.4435v1 [cs.DM] (2009).

21. O. Shcherbina On local block elimination algorithms for solving sparse discrete optimization problems. In: Proceedings of IV All-Russian conference "Optimization problems and economical applications", 2009.

22. O. Shcherbina Local elimination algorithms of query processing in databases. Tavrian Herald of Informatics and Mathematics, 2009, N2.

23. O. Shcherbina, E. Shembeleva Modeling tourism sustainable development. In: CISSE 2009 Proceedings. Volume 2: Innovations in Computing Sciences and Software Engineering (eds T. Sobh , K. Elleithy), Springer 2010.

24. A.V. Sviridenko, O.A. Shcherbina. Benchmarking ordering techniques for nonserial dynamic programming. arXiv:1107.1893v1 [cs.DM]

Presentations

Presentations at international conferences and workshops

1st International Workshop on Global Constrained Optimization and Constraint Satisfaction. Valbonne Sophia Antipolis, France, October 2-4, 2002;

International Workshop "Graph and Hypergraph Decompositions - Methods and Applications in Computer Science" (Vienna, 16. Dec - 18. Dec 2004);

Seminar "Production and Operations Management" (Vienna, University of Vienna, 24.1.2005);

All-Russian Conference «Discrete Optimization and Operations Research» (Russia, Vladivostok, September 7-14 2007);

III and IV All-Russian Conference «Optimization Problems and Economical Applications» (Russia, Omsk, 2006, 2009);

International conferences "Scheduling and decomposition techniques" (Minsk, 2007, 2010);

11 National Conference on Artificial Intelligence (Russia, Dubna, 2008);

Int. Conference on Operations Research "Operations Research 2006" (Karlsruhe, 6-8 September, 2006); Applied Optimization and Metaheuristic Innovations (Abstracts of Int.Conference, Yalta, July 19-21, 2006); Second International Conference MCO 2008 "Modelling, Computation and Optimization in Information Systems and Management Sciences", Metz, France - Luxembourg, September 8-10, 2008;

International conference "Optimization and applications" (OPTIMA2009) September 21-25, 2009 Petrovac, Montenegro.