

DR. MOHAMMAD S. ALKOUSA (Ph.D. in Mathematics)

Links: [Google Scholar](#), [ResearchGate](#), [arXiv](#)

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Profile

- Ph.D. Holder, Passionate Applied math researcher with **23 Scopus published papers** and a devoted teacher with **16 years of teaching experience**, **10 years of research experience**, with a strong command of **3 languages**.
- Data/Place of birth: 1984, Damascus.

Education

Ph.D., MSc and BSc
in mathematics.

- **Ph.D. (Mathematics)** 2015—06.2020.
The dissertation: "*Numerical Methods for Non-Smooth Convex Optimization Problems with Functional Constraints*".
Scientific supervisor: Sc.D. math. Prof. [Alexander V. Gasnikov](#)
Department of Control/Management and Applied Mathematics, Moscow Institute of Physics and Technology (National Research University) [MIPT](#), Moscow, Russia.
- **Master (Mathematics)** 2007—2010.
The dissertation: "*Deep Study in Elliptic Functions Theory*".
Advisor: Assoc. Prof. Mohammad M. Alcheikh. Department of Mathematics, Faculty of Science, Damascus University, Syria.
- **Bachelor (Mathematics)** 2002—2006.
Department of Mathematics, Faculty of Science, Damascus University, Syria.

Publications

23 Scopus
published papers.

5 Preprints.

6 Mini Books.

2 Books.

Published 2023:

1. **M. S. Alkousa**, A. V. Gasnikov, E. L. Gladin, I. A. Kuruzov, D. A. Pasechnyuk, F. S. Stonyakin: *Solving strongly convex-concave composite saddle point problems with a small dimension of one of the variables*. Sbornik Mathematics, Vol. 214, No. 3, pp. 3–53
2. Stonyakin F.S., Ablav S.S., Baran I.V., **Alkousa M.S.**: *Subgradient methods for weakly convex and relatively weakly convex problems with a sharp minimum*. Computer Research and Modeling, vol. 15, no. 2, pp. 393-412.
3. Stonyakin F.S., Savchuk O.S., Baran I.V., **Alkousa M.S.**, Titov A.A.: *Analogues of the relative strong convexity condition for relatively smooth problems and adaptive gradient-type methods*. Computer Research and Modeling, vol. 15, no. 2, pp. 413-432

Published 2022:

4. F. Stonyakin, A. Gasnikov, P. Dvurechensky, A. Titov, **M. Alkousa**: *Generalized Mirror Prox Algorithm for Monotone Variational Inequalities: Universality and Inexact Oracle*. Journal of Optimization Theory and Applications, Vol. 194, pp. 988-1013
5. F. S. Stonyakin, A. A. Titov, D. V. Makarenko, **M. S. Alkousa**: *Some Methods for Relatively Strongly Monotone Variational Inequalities*. Mathematical Notes, 112, pp. 965-977
6. **Alkousa M. S.**, Gasnikov A. V., Dvurechensky P. E., Sadiev A. A., Razouk L. Ya.: *An Approach for Non-Convex Uniformly Concave Structured Saddle Point Problem*. Computer Research and Modeling, Vol. 14, No. 2, pp. 225-237.
7. Savchuk O. S., Titov A. A., Stonyakin F. S., **Alkousa M. S.**: *Adaptive first-order methods for relatively strongly convex optimization problems*. Computer Research and Modeling, Vol. 14, No. 2, pp. 445-472.
8. Ablaev S. S., Makarenko D. V., Stonyakin F. S., **Alkousa M. S.**, Baran I. V.: *Subgradient methods for non-smooth optimization problems with some relaxation of sharp minimum*. Computer Research and Modeling, Vol. 14, No. 2, pp. 473-495.
9. I. A. Kuruzov, F. S. Stonyakin, **M. S. Alkousa**: *Gradient-Type Methods for Optimization Problems with Polyak-Łojasiewicz Condition: Early Stopping and Adaptivity to Inexactness Parameter*. N. Olenov et al. (Eds.): OPTIMA 2022, CCIS 1739, pp. 18-32.
10. S. S. Ablaev, A. A. Titov, F. S. Stonyakin, **M. S. Alkousa**, A. V. Gasnikov: *Some Adaptive First-Order Methods for Variational Inequalities with Relatively Strongly Monotone Operators and Generalized Smoothness*. N. Olenov et al. (Eds.): OPTIMA 2022, LNCS 13781, pp. 135-150.

Published 2021:

11. F. Stonyakin, A. Tyurin, A. Gasnikov, P. Dvurechensky, A. Agafonov, D. Dvinskikh, **M. Alkousa**, D. Pasechnyuk, S. Artamonov, V. Piskunova: *Inexact model: a framework for optimization and variational inequalities*. Optim. Methods and Software, Vol. 36, No. 6, pp. 1155-1201.
12. E. Gladin, **M. Alkousa**, A. Gasnikov: *On solving convex min-min problems with smoothness and strong convexity in one variable group and small dimension of the other*. Automation and Remote Control, Vol. 82, No. 10, pp. 1679-1691.
13. A. Titov, F. Stonyakin, **M. Alkousa**, A. Gasnikov: *Algorithms for solving variational inequalities and saddle point problems with some generalizations of Lipschitz property for operators*. Communications in Computer and Information Science, Vol. 1476, pp. 86-101. Springer, Cham.
14. E. Gladin, A. Sadiev, A. Gasnikov, P. Dvurechensky, A. Beznosikov, **M. Alkousa**: *Solving smooth min-min and min-max problems by mixed oracle algorithms*.

Communications in Computer and Information Science, Vol. 1476, pp. 19-40. Springer, Cham.

Published 2020:

15. F. S. Stonyakin, E. A. Vorontsova, **M. S. Alkousa**: *New Version of Mirror Prox for Variational Inequalities with Adaptation to Inexactness*. OPTIMA 2019. Communications in Computer and Information Science, Vol. 1145. Springer, Cham. pp. 427-442.
16. **M. S. Alkousa**: *On Modification of an Adaptive Stochastic Mirror Descent Algorithm for Convex Optimization Problems with Functional Constraints*. Forum for Interdisciplinary Mathematics. Springer, Singapore. pp. 47-63.
17. **M. S. Alkousa**, D. M. Dvinskikh, F. S. Stonyakin, A. V. Gasnikov, D. Kovalev: *Accelerated Methods for Saddle Point Problems*. *Comput. Math. and Math. Phys.*, Vol. 60, No. 11, pp. 1787–1809.
18. A. A. Titov, F. S. Stonyakin, **M. S. Alkousa**, S. S. Ablav, A. V. Gasnikov: *Analogues of Switching Subgradient Schemes for Relative Lipschitz-Continuous Convex Programming Problems*. Communications in Computer and Information Science, vol 1275. Springer, Cham. pp. 133-149.

Published 2019:

19. A. A. Titov, F. S. Stonyakin, A. V. Gasnikov, **M. S. Alkousa**: *Mirror Descent and Constrained Online Optimization Problems*. Communications in Computer and Information Science, **974**, pp. 64-78.
20. F. S. Stonyakin, **M. S. Alkousa**, A. N. Stepanov, A. A. Titov: *Adaptive Mirror Descent Algorithms for Convex and Strongly Convex Optimization Problems with Functional Constraints*. *J. Appl. Ind. Math.*, **13**(3), pp. 557-574.
21. **M. S. Alkousa**: *On Some Stochastic Mirror Descent Methods for Constrained Online Optimization Problems*. *Computer Research and Modeling*, **11**(2), pp. 205-217.
22. F. S. Stonyakin, **M. S. Alkousa**, A. A. Titov, V. V. Piskunova: *On Some Methods for Strongly Convex Optimization Problems with One Functional Constraint*. *Lecture Notes in Computer Science*, Vol. 11548, pp. 82-96.

Published 2018:

23. F. S. Stonyakin, **M. S. Alkousa**, A. N. Stepanov, M. A. Barinov: *Adaptive mirror descent algorithms in convex programming problems with Lipschitz constraints*. *Trudy Instituta Matematiki i Mekhaniki URO RAN*, **24**(2), pp. 266-279.

Preprints:

1. F. Stonyakin, O. Savchuk, **M. Alkousa**, A. Titov, A. Gasnikov: *Adaptive Algorithms for Relatively Lipschitz Continuous Convex Optimization Problems*. Submitted to the journal *Pure and Applied Functional Analysis*
2. S. Bakhurin, R. Hildebrand, **M. Alkousa**, A. Titov: *Optimization in complex spaces with the Mixed Newton Method*. Submitted to the *Journal of Global Optimization*.
3. F. Stonyakin, A. Titov, **M. Alkousa**, O. Savchuk, D. Pasechnyuk: *Gradient-Type Adaptive Methods for Relatively Lipschitz Continuous Convex Optimization Problems*. Arxiv preprint.
4. I. Kuruzov, **M. Alkousa**, F. Stonyakin, A. Gasnikov: *Gradient-Type Methods for Decentralized Optimization Problems with Polyak-Łojasiewicz Condition over Time-Varying Networks*. Submitted to the journal *Opt. Meth. & Software*
5. O. Savchuk, F. Stonyakin, **M. Alkousa**, R. Zabirowa, A. Titov, A. Gasnikov: *Online Optimization Problems with Functional Constraints under Relative Lipschitz Continuity and Relative Strong Convexity Conditions*. Arxiv preprint.

Books and mini books:

1. Complex Beauties [2018](#), [2019](#), [2020](#), [2021](#), [2022](#), [2023](#) by Elias Wegert, Gunter Semmler (Technical University Bergakademie Freiberg), Pamela Gorkin and Ulrich Daepf (Bucknell University). A translated from English to Arabic.
2. [MIT Integration Bee: Solutions of Qualifying Tests from 2010 to 2023](#). (Book in English), 2023.
3. [Real Infinite Series 1](#). (Book in Arabic), 2021.

Employment History

16 years of teaching experience.

10 years of research experience.

- Jan. 2020—: Researcher in the Laboratory of Mathematical Methods of Optimization ([LabMMO](#)), MIPT, Moscow, Russia.
- Apr. 2020 —: Researcher in Laboratory of Methods for Big Data Analysis (LAMBDA), Higher School of Economics (HSE), Moscow, Russia.
- Feb. 2019—Dec. 2019: Engineer in Laboratory of Numerical Methods of Applied Structural Optimization (NuMASO), MIPT, Moscow, Russia.
- 2017— 2020: Teacher of mathematics in Iraqi school in Moscow, Russia.
- 2013—2014: Analysis 1, 2 and Complex Analysis 1, Al-Baath University, Faculty of Sciences, department of mathematics. Syria, Homs.
- 2013—2014: Teaching Assistant at Al-Baath University, Faculty of Sciences, department of mathematics. Syria, Homs.
- 2010—2011: Mathematics 2, for first year students in The Syrian International Private University for Science and Technology. Syria, Damascus.
- 2008—2014: Mathematics 1, 2, 3 and 4 for first and second year students in Damascus University, Faculty of Engineering. Syria, Damascus.

- 2006—2014: Teacher of mathematics of the last stage in private schools and educational institutions in Syria, Damascus.

Joint projects:

- 2021. Huawei Russian Research Institute. One project led by Prof. [Alexander Gasnikov](#).
- Jan. 2022 — now: Huawei Russian Research Institute. Two projects led by Prof. [Roland Hildebrand](#).

Research Interest and Skills

- **RESEARCH INTEREST:** Different aspects of **mathematical optimization** with applications in Machine Learning, in particular: Convex Optimization, Stochastic Optimization, Distributed Optimization, Variational Inequalities, Saddle Point Problem. **Complex Analysis**.
- **COMPUTER SKILLS:** Microsoft Windows, Microsoft Word, Excel, etc.
- **Programming languages:** Python (implement methods for mathematical optimization problems and the applications in Machine Learning and Data Analysis), LaTeX.
- **LANGUAGES:** Arabic (Native), Russian (Advanced Knowledge) and English (Advanced Knowledge).

Conferences

1. Some Adaptive First-Order Methods for Variational Inequalities with Relatively Strongly Monotone Operators and Generalized Smoothness. XIII International Conference Optimization and Applications (OPTIMA-2022), Petrova, Montenegro, September 26 - 30, 2022. (Online, Zoom)
2. Gradient-Type Adaptive Methods for Relatively Lipschitz Convex Optimization Problems. The seventh international conference "Quasilinear Equations, Inverse Problems and Their Applications". Moscow, MIPT, 25.08.2021. (Online, Zoom).
3. Accelerated Methods for Saddle Point Problems. Fifth international conference "Quasilinear Equations, Inverse Problems and Their Applications". Moscow, MIPT, 02.12.2019.
4. Accelerated Methods for Saddle Point Problems. 62nd Scientific Conference MIPT. Moscow, 23.11.2019.
5. On Some Methods for Strongly Convex Optimization Problems with One Functional Constraint. International conference "Equation of Convolution Type in Science and Technology" ECTST-2019, Simferopol, Russian Federation, September 25—28, 2019.
6. On Some Methods for Strongly Convex Optimization Problems with One Functional Constraint. 18th International Conference on Mathematical Optimization Theory and Operation Research (MOTOR-2019), Ekaterinburg, Russia, July 8—12, 2019.

7. Adaptive Mirror Descent Algorithms for Constrained Convex Optimization with Lipchitz-Continuous Functionals. Conference on graphs, networks, and their applications (Workshop Network Optimization). Moscow, MIPT, 16.05.2019.
8. On Some Mirror Descent Algorithms for Strongly Convex Optimization Problems with Functional Constraints. 61st Scientific Conference MIPT. Moscow, 24.11.2018
9. Zipper Family of Algorithms for Numerically Conformal Mappings and Welding. 60th MIPT scientific conference, October 20—26, 2017.

References

1. [Alexander V. Gasnikov](#). gasnikov.av@mipt.ru, gasnikov@yandex.ru
 - Professor at MIPT, Department of Control and Applied Mathematics, Moscow, Russia.
 - Professor at Higher School Economics (HSE), Faculty of Computer Science, Moscow, Russia.
 - Lead researcher at IITP RAS, Moscow, Russia.
 - Head of the group at Huawei project, Moscow, Russia.
2. [Roland Hildebrand](#). roland.hildebrand@univ-grenoble-alpes.fr
 - Professor at Laboratoire Jean Kuntzmann, Grenoble, rue des Mathématiques, France.
3. [Pavel Dvurechensky](#). Pavel.Dvurechensky@wias-berlin.de
 - Research associate, Research Group 6 "Stochastic Algorithms and Nonparametric Statistics", Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany.
 - Senior Research Fellow: Higher School Economics (HSE), Faculty of Computer Science, Moscow, Russia.
4. [Fedor S. Stonyakin](#). fedyor@mail.ru
 - Associate Professor at V.I. Vernadsky Crimean Federal University. Algebra and Functional Analysis Department, Russia.
 - Senior Researcher in Laboratory of Numerical Methods of Applied Structural Optimization (NuMASO), MIPT, Moscow, Russia.