

# Fatemeh Koorepazan-Moftakhar

## Personal details

Homepage [Github](#)  
E-mail [f.k.moftakhar.1@gmail.com](mailto:f.k.moftakhar.1@gmail.com)  
[fatemeh.moftakhar@fmph.uniba.sk](mailto:fatemeh.moftakhar@fmph.uniba.sk)

## Employment

04/2022- **Postdoctoral Researcher.**  
03/2023 Comenius University, Slovakia  
01/2022- **Visiting Researcher.**  
03/2022 Comenius University, Slovakia  
03/2021- **Scientific Researcher.**  
03/2022 Panoptopia, Iran  
01/2018- **University Lecturer.**  
02/2022 Islamic Azad University, Science and Research Branch, Iran  
07/2019- **Postdoctoral Researcher.**  
06/2020 Sharif University of Technology, Iran  
01/2016- **Managing Editor of Mathematics Interdisciplinary Research.**  
12/2020 University of Kashan, Iran  
09/2013- **Ph.D. Fellow.**  
09/2018 University of Kashan, Iran

## Education

2013-2018 **Ph.D. in Mathematics**, University of Kashan.  
Thesis: *The Supercharacter Theories of a Finite Group and the Structure of Their Associated Normal Subgroups*  
Advisors: Prof. Ali Reza Ashrafi, Prof. Mohammad Reza Darafsheh  
2010-2013 **M.Sc. in Mathematics**, University of Kashan.  
Thesis: *Counting Assembly Pathway by Using Permutation Group Action*  
Prof. Ali Reza Ashrafi, Dr. Mohammad Javad Najafi-Arani

## Awards

2023 Full Grant Award of CIMPA, France (for participating in a summer school in Turkey)  
2022 Full Grant Award of GAP Days Summer 2022, Germany  
2022 Full Grant Award of CIMPA, France (for participating in a summer school in Lebanon)  
2022 Travel Grant Award of AUF, Lebanon  
2021 Travel Grant Award of 8EMC, Slovenia  
2020 Winner of the Shahid Tehrani Moghadam Award by the Iran's National Elites Foundation, Iran

- 2019 Winner of the Shahid Chamran Grant by the Iran's National Elites Foundation to be a Post-Doctoral Researcher at Sharif University of Technology, Iran
- 2018 Outstanding Student Award, Iran
- 2018 First rank in PhD (GPA 19.75 out of 20)
- 2018 Travel Grant Award of ISCD summer school, France
- 2018 Distinguished Ph.D. Student Award, Iran
- 2017 Visiting Research Fund, Ministry of Science and Technology, Iran
- 2016 Travel Grant Award of 7EMC, Germany
- 2014 Distinguished Ph.D. Researcher Award, Iran
- 2013 Third rank in M.Sc.
- 2013 Distinguished M.Sc. Researcher Award, Iran
- 2013 Best Logo Award in ERICE 58<sup>th</sup> Workshop: CARBON TOPOLOGY, Italy

## Research interests

- Computational Graph Theory, Computational Group Theory
- Machine Learning (Graph Neural Networks and Knowledge Graph): Design, build, and deploy machine learning algorithms to solve real-world and theoretical problems

## Publications

All papers are available on Google Scholar

**Note:** In my domain, the authors of an article are typically listed in alphabetical order.

### Selected journal articles

- R. Jajcay, F. Koorepazan-Moftakhar, Computer aided constructions of cages, *RIMS, Kokyuroku* **9** (2022) 64–73.
- S. Akbari, K.C. Das, S. Ghezelahmad, F. Koorepazan-Moftakhar, Hypoenergetic and nonhypoenergetic digraphs, *Linear Algebra Appl.* **618** (2021) 129–143.
- S. Akbari, K.C. Das, M. Ghahremani, F. Koorepazan-Moftakhar, E. Raoufi, Energy of graphs containing disjoint cycles, *MATCH Commun. Math. Comput. Chem.* **86**(3) (2021) 543–547.
- A.R. Ashrafi, L. Ghanbari, K. Kavousi, F. Koorepazan-Moftakhar, An algorithm for constructing all supercharacter theories of a finite group, *Ars Math. Contemp.* **18** (2020) 149–162.
- A.R. Ashrafi, F. Koorepazan-Moftakhar, M.A. Salahshour, Counting the number of centralizers of 2-element subsets in a finite group, *Comm. Algebra* **48**(11) (2020) 4647–4662.
- S. Akbari, M. Ghahremani, I. Gutman, F. Koorepazan-Moftakhar, Orderenergetic graphs, *MATCH Commun. Math. Comput. Chem.* **84** (2020) 325–334.
- A. Aashtab, S. Akbari, E. Ghasemian, A.H. Ghodrati, M.A. Hosseinzadeh, F. Koorepazan-Moftakhar, On the minimum energy of regular graphs, *Linear Algebra Appl.*, **581**(15) 51–71 (2019).
- A.R. Ashrafi, F. Koorepazan-Moftakhar, Counting the number of supercharacter theories of a finite group, *C. R. Math. Acad. Sci. Paris* **357** (2019) 323–326.
- A.R. Ashrafi, F. Koorepazan-Moftakhar, On normal graph of a finite group, *Filomat* **32**(11) (2018) 4047–4059.
- F. Koorepazan-Moftakhar, A.R. Ashrafi, Note on symmetry of molecules, *MATCH Commun.*

*Math. Comput. Chem.* **78** (2017) 273–279.

- F. Koorepazan-Moftakhar, A.R. Ashrafi, Combination of distance and symmetry in some molecular graphs, *Appl. Math. Comput.* **281**(30) (2016) 223-232.
- F. Koorepazan-Moftakhar, A.R. Ashrafi, Distance under symmetry, *MATCH Commun. Math. Comput. Chem.* **74** (2015) 259–272.

## Book

(Translation to Persian) Algebraic Models of Accounting Systems, Arnika, 2022.

## Book chapters

- F. Koorepazan-Moftakhar, A. R. Ashrafi, O. Ori and M. V. Putz, Atlas of  $\rho$ ,  $\rho^E$  and  $TM - EC$  for Fullerenes Isomers, In: Sustainable Nanosystems Development, Properties, and Applications, M. V. Putz(Ed.) IGI-Global, 2017, pp. 615–656.
- M. Faghani, G. Y. Katona, A. R. Ashrafi and F. Koorepazan-Moftakhar, A Lower Bound for Graph Energy of Fullerenes, In: Distance, Symmetry, and Topology in Carbon Nanomaterials, A. R. Ashrafi and M. V. Diudea (Eds.), Springer Verlag, London, 2016, Chapter 26, pp. 463-471.
- M. V. Diudea, A. Parvan-Moldovan, F. Koorepazan-Moftakhar and A. R. Ashrafi, Topological Symmetry of Multi-Shell Clusters, In: Distance, Symmetry, and Topology in Carbon Nanomaterials, A. R. Ashrafi and M. V. Diudea (Eds.), Springer Verlag, London, 2016, Chapter 5, pp. 61-82.
- A. R. Ashrafi, F. Koorepazan-Moftakhar and M. V. Diudea, Distance under Symmetry: (3,6) –Fullerenes, In: Distance, Symmetry, and Topology in Carbon Nanomaterials, A. R. Ashrafi and M. V. Diudea (Eds.), Springer Verlag, London, 2016, Chapter 4, pp. 51-60.
- F. Koorepazan-Moftakhar and A. R. Ashrafi, An Algebraic Modification of Wiener and Hyper-Wiener Indices and their Calculations for Fullerenes, In: Distance, Symmetry, and Topology in Carbon Nanomaterials, A. R. Ashrafi and M. V. Diudea (Eds.), Springer Verlag, London, 2016, Chapter 3, pp. 33-50.
- A. R. Ashrafi, F. Koorepazan-Moftakhar and O. Ori, Symmetry and Topology of Graphenes, In: Handbook of Graphene Science, Z. A. Niknam (Ed.), CRC Press, 2016, Chapter 10, pp. 159–164.
- F. Koorepazan-Moftakhar, A. R. Ashrafi and O. Ori, Geometry and Topology of Nanotubes and Nanotori, In: Exotic Properties of Carbon Nanomatter: Advances in Physics and Chemistry, M. V. Putz and O. Ori (Eds.), Springer Verlag, London, 2015, Chapter 6, pp. 131–152.
- F. Koorepazan-Moftakhar, A. R. Ashrafi, O. Ori and M. V. Putz, Sphericity of Some Classes of Fullerenes Measured by Topology, In: Fullerenes: Chemistry, Natural Sources and Technological Applications, Sh. B. Ellis (Ed.), Nova Science Publishers, 2014, 285–304.

## Completed research project

- January 2022 - March 2023: External Locally Uniform Combinatorial Structures (Postdoctoral researcher at Comenius University)
- July 2019 - June 2020: Generalization of Signless Laplacian Matrices and Their Applications in Complex Networks (Postdoctoral researcher at Sharif University of Technology)
- September 2013 - August 2018: The Supercharacter Theories of a Finite Group and the Structure of Their Associated Normal Subgroups (Ph.D. Thesis)
- April 2017 - January 2019: Relationship between Stability and Structure Invariants of Fullerenes and Nanotubes (with A.R. Ashrafi)
- October 2015 - February 2017: Effect of Topology and Symmetry on Nanostructures (with A.R. Ashrafi)

- June 2014 - February 2015: Distanced-Symmetry Based Indices of Fullerenes, Nanotubes, Nanocones and Noanstars (with A.R. Ashrafi)
- July 2013 - April 2014: Symmetry Groups of Nanotubes and Nanotori (with A.R. Ashrafi)
- July 2012 - October 2014: Using of Polya Counting Theorem and Cycle Index Polynomial of a Finite Group (with A.R. Ashrafi, H. Shabani, E. Haghi, A. Tadayon-Far, H. Khodashenas, M. Hakimi-Nezhad)
- September 2010 - August 2013: Counting Assembly Pathway by Using Permutation Group Action (Master Thesis)

## **Talks on conferences**

- An algorithm for constructing all supercharacter theories of a finite group, GAP Days Summer 2022, Aachen, Germany, October 17-21, 2022.
- Constructions of Small Regular Graphs of Given Degree and Girth Using Voltage Lift Graphs and Computer Searches, 22<sup>nd</sup> Conference ITAT, Slovakia, September 24, 2022.
- Some bounds on the energy of graphs, Graph Theory and Interactions, Beirut, Lebanon, June 6-14, 2022.
- A Brief Introduction to SageMath, Algebraic Graph Theory Seminar, Comenius University, Bratislava, Slovakia, April 29, 2022.
- Algebraic Models for Accounting Systems, Algebraic Graph Theory Seminar, Comenius University, Bratislava, Slovakia, March 4, 2022.
- Constructing Supercharacter Theories of Finite Groups, 48<sup>th</sup> Annual Iranian Mathematics Conference, Hamedan, Iran, August 22-25, 2017.
- Symmetry of Cubic Graphs, International Conference Bio-Nano-Math-Chem, Cluj, Romania, June 29, 2017.
- Towards the Classification of Finite Simple Groups with exactly Three or Four Supercharacter Theories, 47<sup>th</sup> Annual Iranian Mathematics Conference, Karaj, Iran, August 28-31, 2016.

## **Teaching**

Instructor    Calculus, Python Programming, Linear Algebra, Discrete Structure  
 Teacher      Calculus, Algebra I, Linear Algebra, Complex Functions, Differential Equations  
 Assistant

## **Honorary activities**

- Reviewer of the American Mathematical Reviews
- Contributed on writing a book on graph theory with Prof. S. Akbari

## **Membership in scientific society**

2014-2018    Member of European Society of Mathematical Chemistry (ESMC)  
 2015-2019    Iranian Mathematical Society

## **Skills**

Software    GAP, Sage, LaTeX, GeoGebra, NewGraph, Maple, MAGMA, Microsoft Office, HyperChem, TopoCluj, ChemDraw, Nanotube Modeler

Language Python (Pandas, Numpy, Scikit-learn)  
Programming

Knowledge of Machine Learning, Graph Neural Network, Knowledge Graph

## Language skills

Persian Native language  
English Professional working proficiency  
German Basic

## References

- **Prof. Ali Reza Ashrafi**, Department of Pure Mathematics, University of Kashan, Iran, ashrafi@kashanu.ac.ir (passed away on January 2023)
- **Prof. Ivan Gutman**, Faculty of Science, University of Kragujevac, Serbia, gutman@kg.ac.rs
- **Prof. Ottorino Ori**, Actinium Chemical Research Institute, 00182 Rome, Italy, ottorino.ori@gmail.com
- **Prof. Wilfried Imrich**, Department für Mathematik und Informationstechnologie of Montanuniversität Leoben, Austria, imrich@unileoben.ac.at
- **Prof. Robert Jajcay**, Faculty of Mathematics, Physics, and Computer Science, Comenius University, Slovakia, robert.jajcay@fmph.uniba.sk