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Review Paper

Honoring the memory of professor Ali Reza Ashrafi

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Dedicated to Prof. Alireza Ashrafi

Abstract. Ali Reza Ashrafi (10 May 1964–9 January 2023) was an Iranian mathematician who worked in computational group theory and mathematical chemistry. Ashrafi was a professor at the Department of Pure Mathematics of the University of Kashan.

1 Introduction

On January, 9, 2023 the university of Kashan lost a member of its family. Professor Ali Reza Ashrafi, our friend and colleague, a distinguished member of the Pure Mathematics faculty since 1998, died hit by a car in front of his house. We pray for his soul and offer our deepest condolences for the terrible loss to his wife Shahrzad Yousefi, to his daughters Ghazal and Maryam, his brother Abdul Reza and their families, and other relatives and friends.

Professor Ashrafi was a hard-working and likable person, a great scientist and a teacher. The enduring contributions he made in the classroom and to the Iranian and international scientific community will be felt for many years into the future. In the twenty-five years Professor Ashrafi taught at the University of Kashan he helped to educate hundreds of MSC

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and Ph. D students. The contributions of these graduates are felt every day throughout this country from Kashan to Tehran, from the north to the south, and from the east to the west of Iran.

Ali Reza Ashrafi was born on May 10, 1964, in Tehran, Iran. He graduated with respectively BSC and MSC in Pure Mathematics at the "Teacher Training University of Tehran" in 1989 and Shahid Beheshti University of Iran in 1991. His project topic in MSC was "Monoidal Categories". He got his Ph. D in Pure Mathematics at the University of Tehran, Iran in 1996 under the supervision of Prof. Mohammad Reza Darafsheh. The title of his thesis was "The Irreducible Character Table of the Group Aut(PSL(5,3))".

Professor Ashrafi was not only a professor but also a scholar. In his twenty-five-year scientific career, Professor Ashrafi authored hudreds of articles, book chapters and conference papers. More precisely, his 457 international scientific articles and 65 conference papers have been cited more than 8852 times (in Google Scholars) to date. His papers were published in reputed journals in Mathematics, Chemistry, Physics, NanoSciTech, Material Science, and other areas of science.

Among many scientific achievemants of Ali Reza Ashrafi one should be particilarly emphasized and this is his contribution to the establishment of a new scientific field of Mathematical Chemistry. he was one of pioneers of this discipline not only in Iran but also on the international scene.

We cannot give here a comprehensive survey of Ali Reza's scientific opus. Instead, we just list some of his achievemants.

Some of his awards and honors include:

2021: Wiener of Sialk Medal for Science, Mayor of Kashan, I. R. Iran
2020: Distinctive Researcher: University of Kashan, I. R. Iran
2019: Distinctive Researcher: University of Kashan, I. R. Iran
2018: Distinctive Researcher: University of Kashan, I. R. Iran
2017: Distinctive Researcher: University of Kashan, I. R. Iran
2016: Distinctive Researcher: University of Kashan, I. R. Iran
2015: Distinctive Researcher: University of Kashan, I. R. Iran
2014: Distinctive Researcher: University of Kashan, I. R. Iran
2013: Distinctive Researcher: University of Kashan, I. R. Iran
2012: Distinctive Researcher: University of Kashan, I. R. Iran
2011: Distinctive Researcher: Isfahan Province, I. R. Iran
2010: Distinctive Researcher: University of Kashan, I. R. Iran
2010: Member of the International Academy of Mathematical Chemistry (IAMC)
2010: The Third Iranian Scientist in Nanotechnology in the Fifth Top 10 Festival of Iran Nanotechnology Initiative Council
2009: Distinctive Researcher in Basic Sciences of the Country
2009: Distinctive Researcher: University of Kashan, I. R. Iran
2009: The Second Iranian Scientist in Nanotechnology in the Fourth Top 10 Festival of Iran Nanotechnology Initiative Council

2008: Distinctive Researcher: University of Kashan, I. R. Iran
2008: The Second Iranian Scientist in Nanotechnology in the Third Top 10 Festival of Iran Nanotechnology Initiative Council
2007: Distinctive Researcher: University of Kashan, I. R. Iran
2007: The First Iranian Scientist in Nanotechnology in the Second Top 10 Festival of Iran Nanotechnology Initiative Council
2006: Distinctive Researcher: University of Kashan, I. R. Iran
2006: The 8th Iranian Scientist in Nanotechnology in the First Top 10 Festival of Iran Nanotechnology Initiative Council
2005: Distinctive Researcher: University of Kashan, I. R. Iran
2004: Distinctive Researcher: University of Kashan, I. R. Iran
2004: Distinctive Researcher: Isfahan Province, I. R. Iran
2003: Distinctive Researcher: University of Kashan, I. R. Iran
2002: Distinctive Researcher: University of Kashan, I. R. Iran
2001: Distinctive Researcher: University of Kashan, I. R. Iran
1995: Top Student in Ph. D Class, University of Tehran, I. R. Iran

He was the Editor-in-Chief of journals: International Journal of Science and Technology, Iranian Journal of Mathematical Chemistry, and Bulletin of the Iranian Mathematical Society(2012-2013). Further, he was a member of the editorial board of the following journals:

- Bulletin of the Iranian Mathematical Society,
- Discrete Mathematics Letters,
- Karbala International Journal of Modern Science,
- Fullerenes, Nanotubes and Carbon Nanostructures,
- Italian Journal of Pure and Applied Mathematics,
- Bulletin of the Iranian Mathematical Society,
- International Journal of Group Theory,
- Transaction on Combinatorics,
- Bulletin of the Iranian Mathematical Society,
- Journal of Advanced Mathematical Studies,
- MATCH Communications in Mathematical and in Computer Chemistry.

Also, **his academic employment** were:

- 2014-2020 Vice-Dean in Research, Faculty of Mathematical Sciences, University of Kashan, Kashan, I R Iran,
- 2011-2015 Head of the Department of Nanocomputing, Institute for Nanoscience and Nanotechnology, University of Kashan, Kashan, I. R. Iran,
- 2008-2009 Head of the Department of Mathematics, University of Kashan, Kashan, I. R. Iran,
- 2005-present Professor of Mathematics, Department of Mathematics, University of Kashan, Kashan, I. R. Iran,
- 2001-2005 Associate Professor of Mathematics, Department of Mathematics, University of Kashan, Kashan, I. R. Iran,
- 2000-2001 Dean of the Faculty of Science, University of Kashan, Kashan, I. R. Iran,
- 1999 Vice Dean of the Faculty of Science, University of Kashan, Kashan, I. R. Iran,
- 1996-2000 Assistant Professor of Mathematics, Department of Mathematics, University of Kashan, Kashan, I. R. Iran.

His scientific books in Persian are:

- A. Iranmanesh, A. R. Ashrafi, A. Loghman and B. Soleimani, PI Index of Nanotubes and Nanotori, Tarbiat Modares University (Jihad Daneshgahi), Tehran, 2008.
- A. Bahrami, J. Yazdani, H. Yousefi-Azari and A. R. Ashrafi, Nanocomputing and Fullerenes, Andisheh Zohoor, Tehran, 2008.
- A. R. Ashrafi, M. Ghorbani and M. Jalali, Mathematics of Fullerenes, Part I: Topological Indices, Soroush Danesh & University of Kashan Press, Tehran, 2010.
- A. R. Ashrafi and M. Ghorbani, Mathematics of Fullerenes, Part II: Counting Problems, Soroush Danesh & University of Kashan Press, Tehran, 2010.
- M. Ghorbani, A. R. Ashrafi, M. Jalali and M. A. Hossein-Zadeh, Omega and Sadhana Polynomials of Nano Structures, Shahid Rajaee University Press, Tehran, 2010.
- M. A. Iranmanesh, A. R. Ashrafi and K. Amini, Yazd University Press, Yazd, 2015.

Furtheremore, he was the author of 21 **book chapters** as follows, see [1]:

- A. Ilić, M. V. Diudea, F. Gholami-Nezhaad and A. R. Ashrafi, Topological Indices in Nanocones, In: Novel Molecular Structure Descriptors-Theory and Applications I, I. Gutman, B. Furtula (Eds.), University of Kragujevac, Kragujevac, 2010; pp. 217-226.

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- A. R. Ashrafi, Topological indices of Nanostructures, In: Quantum Frontiers of Atoms and Molecules, Mihai V. Putz (Ed.), Nova Publisher, 2011; pp. 499-520.
- A. R. Ashrafi and H. Shabani, Exact Formulas for the Wiener Index of Graph Operations, In: Distance in Molecular Graph Theory, I. Gutman, B. Furtula (Eds.), University of Kragujevac, 2012; pp. 223-230.
- A. Iranmanesh, A. R. Ashrafi, A. Graovac, F. Cataldo and O. Ori, Wiener Index Role in Topological Modeling of Hexagonal Systems-From Fullerenes to Graphene, In: Distance in Molecular Graphs-Applications, I. Gutman, B. Furtula (Eds.), University of Kragujevac, 2012; pp. 135-155.
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- A. R. Ashrafi, M. A. Iranmanesh and Z. Yarahmadi, Study of Fullerenes by some new Topological Index, In: Topological Modelling of Nanostructures and Extended Systems, A. R. Ashrafi, F. Cataldo, A. Iranmanesh, O. Ori (Eds.), Carbon Materials: Chemistry and Physics 7, Springer-Varlag, 2013; pp. 473-486.
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- A. R. Ashrafi, F. Koorepazan-Moftakhar, M. V. Diudea and M. Stefu, Mathematics of D_5 Network, In: Diamond and Related Nanostructures, M. V. Diudea and C. L. Nagy (eds.), Carbon Materials: Chemistry and Physics 6, Springer-Varlag, 2013; pp. 321-333.
- A. Graovac, A. R. Ashrafi and O. Ori, Topological Efficiency Approach to Fullerene Stability-Case Study with C_{50}, In: Advances in Mathematical Chemistry and Applications, Vol. 2, S. C. Basak, G. Restrepo and J. L. Villaveces (Eds.), Bentham Science Publishers, 2014; pp. 3-23.

- A. R. Ashrafi and F. Koorepazan-Moftakhar, Fullerenes and Capped Nanotubes: Applications and Geometry, In: Handbook of Functional Nanomaterials, Vol. 3: Application and Development, M. Aliofkhazraei (Ed.), Nova Publishers, New York, 2014; pp. 225-237.

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- 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, M. V. Diudea (eds.), Carbon Materials: Chemistry and Physics 9, Springer-Varlag, 2016; pp. 463-471.

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Ashrafi was invited as a speaker in 10 national and international meetings.

Professor Ashrafi will be deeply missed by all who knew him, collaborated with him, and were taught by him. His friends and colleagues will always fondly remember Ali Reza's enthusiasm, warmth, and humor, and above all, his ready wit. Ali Reza loved to recount anecdotes from his numerous contacts with many great scientists of the world.

Professor Ali Reza Ashrafi was a good and kind man. His departure leaves a great void in lives of all those who knew and who loved him. In recognition of the professor and person that Ali Reza Ashrafi was, the Editorial Board gratefully dedicates Issue One of Volume 10 of the Journal of Discrete Mathematics and Its Applications to the memory of Professor Ashrafi.

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