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Review Paper

Scientific cooperation Ashrafi–Gutman

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Dedicated to Prof. Alireza Ashrafi

1 Prologue

Ali Reza was my friend. I firmly believe that this friendship was mutual. In my long academic career, I had scientific cooperation with numerous colleagues (more than 800), but very few of them where my friends.

Somewhere in the first years of the present century, I noticed that in Iran there is a mathematician producing remarkable results in Mathematical Chemistry. Soon we got in touch, soon we started to do joint research, soon Ali Reza became member of Editorial Board of our "*MATCH Communications in Mathematical and in Computer Chemistry*" (where he published a total of 43 contributions). Eventually, we met on many mathematical chemistry conferences held in Iran, when I experienced the unforgettable Iranian hospitality. We also met on a couple of conferences in Dubrovnik, Croatia, on one of which Ali Reza was elected member of the International Academy of Mathematical Chemistry (to what I contributed a bit).

2 The Ashrafi–Gutman papers

Ali Reza Asharfi was a great mathematician, whose interests and skills extended far beyond Mathematical Chemistry. Yet, all what we achieved together, contained in 16 joint publications [1–16], belongs to Mathematical Chemistry.

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Correction: Ali Reza Asharfi is a great mathematician.

Our joint scientific publications belong to the period 2008–2020. Our last paper appeared in 2020, when I was already seriously ill. Although I later recovered and continued with my scientific activities, the Lord decided that Ali Reza has to leave before me.

When collecting the papers jointly published with Ali Reza, I myself was amazed with the great variety of topics that we studied. These are:

- polycyclic aromatic compounds [5],
- Szeged index and its variants [6, 10, 13],
- Laplacian energy [2],
- graph energy [7],
- Estrada index [1],
- geometric–arithmetic index [12],
- PI index [5, 16],
- Wiener index and its extensions [11, 14],
- characterization of block graphs [11],
- graph irregularity [15],
- Kirchhoff index [9],
- forgotten index [8],
- multiplicative Zagreb index [3],
- various degree-based graph invariants [4].

This variety of topics witnesses of Ali Reza's broad interest in all aspects of Mathematical Chemistry.

My sincere thanks to Ali Reza for helping me to publish one of these papers, [7], in Persian language. This was a great joy to me, and I am proud of it ever since.

In compressed form, our joint papers can be classified as concerned with:

- distance-based graph invariants [5, 6, 9–11, 13, 14, 16],
- degree-based graph invariants [3, 4, 8, 12, 15],
- spectrum-based graph invariants [1, 2, 7].

Note, however, that Ashrafi's other main research interest and contributions were in the areas of group theory, graph products, fullerenes & nanotubes, . . . , where we did not do any joint research.

3 Epilogue

Farewell good man Ali Reza Ashrafi. You passed away ahead of schedule, but what remained after you is perennial.

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