

# Curriculum Vitae

Behruz Tayfeh-Rezaie

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## Personal Data

Date of Birth: March 30, 1971

Place of Birth: Orumiyeh, Iran

Current Position: Professor, School of Mathematics, Institute for Research in Fundamental Sciences (IPM)

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## Employment

- Faculty member, School of Mathematics, IPM, 2006-now.
- Senior Postdoctoral fellow, School of Mathematics, IPM, 2003-2005.
- Postdoctoral fellow, School of Mathematics, IPM, 2000-2002.

## Education

- Ph.D. in Mathematics (Combinatorics), Department of Mathematics and Computer Sciences, University of Tehran, Tehran, Iran, 2000.
- M.S. in Mathematics, Department of Mathematics and Computer Sciences, University of Tehran, Tehran, Iran, 1996.
- B.Sc. in Computer Hardware Engineering, Faculty of Computer Engineering, Sharif University of Technology, Tehran, Iran, 1994.

## **Research Interests**

- Probabilistic methods in combinatorics, random graphs
- Spectral graph theory, algebraic graph theory
- combinatorial design theory ( $t$ -designs, large sets of  $t$ -designs, trades, Hadamard matrices and orthogonal designs)
- Computational methods in constructive combinatorics.

## **Teaching Experience**

- Random Graphs, IPM, Spring 2017.
- Probabilistic Methods in Combinatorics, IPM, Fall 2016.
- Discrete Mathematics, University of Azzahra, Spring 2004.
- Lectures on large sets of  $t$ -designs, IPM, January 2003.
- Discrete Mathematics, University of Azzahra, Spring 2002.
- Teaching assistant, Discrete Mathematics, G. B. Khosrovshahi, University of Tehran, Spring 1999 and Fall 1998.
- General Mathematics, University of Tehran, Spring 1998 and Fall 1996.
- Differential Equations, University of Tehran, Fall 1997.
- Foundations of Computer, Azad University, Qazvin, Spring 1994.

## **Editorial Board**

Bulletin of the Iranian Mathematical Society, 2019-Present.

Transactions on Combinatorics, 2011-Present.

## **Awards and Grants**

- Junior associateship, The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy, 2005–2012.
- Distinguished researcher, IPM, 2004.

- Grant from International Congress of Mathematicians 2002, Beijing, China.
- The young mathematician award, IPM, 2001.
- The second award for the best project on fundamental research (with G. B. Khosrovshahi *et al.*), The 13th international Kharazmi festival.
- Mehrabadi award, Iranian Mathematical Society and Sharif University of Technology, 1999.
- Doctoral scholarship, IPM, 1996–1999.

### Visits

- University of Lethbridge, Lethbridge, Canada, July 2017.
- Eotvos Lorand University, Budapest, Hungary, June 2015.
- University of Lethbridge, Lethbridge, Canada, June–July 2014.
- Simon Fraser University, Vancouver, Canada, August 2013–February 2014.
- University of Lethbridge, Lethbridge, Canada, June–August 2013.
- Alfred Renyi Institute of Mathematics, Budapest, Hungary, August 24–31, 2012.
- The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy, August–September 2012.
- University of Lethbridge, Lethbridge, Canada, February 2011.
- The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy, June–July 2010.
- The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste, Italy, June–July 2009.
- University of Lethbridge, Lethbridge, Canada, April 2009.
- University of Tilburg, Tilburg, The Netherlands, July–August 2008.
- University of Lethbridge, Lethbridge, Canada, June–August 2006.
- Laboatoire de recherche en informatique, Université Paris Sud, Paris, France, November, 2003.
- University of Lethbridge, Lethbridge, Canada, June–September 2002.
- University of Lethbridge, Lethbridge, Canada, May–August 2001.

## Student Supervision

### • PhD

M.R. Bidgoli, Institute for Research in Fundamental Sciences (IPM), 2021 (Supervisor).

Ozra Naserian, University of Zanjan, 2015 (Advisor).

F. Ashraf, Isfahan University of Technology, 2014 (Co-Supervisor).

F. Ramezani, Amirkabir University of Technology, 2010 (Supervisor).

Gholam Reza Omid, University of Tehran, 2006 (Advisor).

### • MSc

Zahra Pishbaz, Shahid Rajaei Teacher Training University, 2011 (Supervisor).

Maryam Farahmand Asil, University of Tehran, 2008 (Advisor).

Maliheh Chavooshi, University of Tehran, 2008 (Advisor).

Mohsen Ghoreishi, University of Tehran, 2006 (Advisor).

Mohyeddin Falahat, Sharif University of Technology, 2005 (Supervisor).

## Conference Organization

• IPM Combinatorics and Computing Conference 2023 (IPMCCC2023), May 8-11, 2023, IPM, Tehran, Iran.

• IPM Combinatorics and Computing Conference 2021 (IPMCCC2021), May 17-20, 2021, IPM, Tehran, Iran.

• IPM Combinatorics and Computing Conference 2019 (IPMCCC2019), April 16-18, 2019, IPM, Tehran, Iran.

• IPM Combinatorics and Computing Conference 2017 (IPMCCC2017), May 16-18, 2017, IPM, Tehran, Iran.

• IPM Combinatorics and Computing Conference 2015 (IPMCCC2015), April 29-30, 2015, IPM, Tehran, Iran.

• The Fourth Conference on Algebraic Combinatorics, November 2-3, 2011, Bu-Ali Sina University, Hamedan, Iran.

- Linear Algebraic Techniques in Combinatorics and Graph Theory, January 30 - February 4, 2011, Banff, Canada.
- The Second Conference on Algebraic Combinatorics, May 12-13, 2010, Ferdowsi University of Mashhad, Mashhad, Iran.
- IPM 20 – Combinatorics 2009, May 15–21, 2009, Tehran, Iran.

### Invited Talks

- *Classification of Skew-Hadamard Matrices of Small Orders*, 6th Workshop on Algebraic Designs, Hadamard Matrices & Quanta, June 27–July 2, 2022, Krakow, Poland.
- *Weak Saturation Number of Complete Bipartite Graphs*, International Workshop on Extremal Combinatorics, May 18–19, 2022, Isfahan, Iran.
- *Bipartite graph bootstrap percolation*, Iranian-Hungarian Workshop on Combinatorics, May 12–14, 2018, Isfahan, Iran.
- *Hadamard matrices with few distinct types*, Special Western Canada Linear Algebra meeting, July 8–9, 2017, Banff, Canada.
- *Classification of Hadamard Matrices of Small Orders*, Second SBU Combinatorics Day, May 11, 2016, Shahid Beheshti University, Tehran.
- *Some inequalities for Laplacian and signless Laplacian eigenvalues of graphs*, One-Day Seminar On Algebraic Graph Theory, May 13, 2015, University of Tehran, Tehran.
- *Constructive Classification of Combinatorial Objects*, IASBS Combinatorics and Graph Theory workshop 2014, September 3–5, 2014, IASBS, Zanjan.
- *Eigenvalues of Graphs*, IASBS Combinatorics and Graph Theory workshop 2014, September 3–5, 2014, IASBS, Zanjan.
- *Classification of Hadamard matrices of small orders*, Workshop on Algebraic Design Theory and Hadamard Matrices (ADTHM) 2014, July 8–11, 2014, Lethbridge, Canada.
- *Large sets of  $t$ -designs*, The first IPM-Isfahan workshop on combinatorics, May 20–22, 2014, Isfahan, Iran.
- *Maximum order of graphs with given  $\mu$ -rank*, DIMACOS '12, International Conference on Discrete Mathematics and Computer Science, November 13–17, 2012, Lebanese University, Beirut, Lebanon.

- *On Rank of Graphs*, ICTP-IPM Workshop and Conference in Combinatorics and Graph Theory, September 3–14, 2012, ICTP, Trieste, Italy.
- *On Rank of Graphs*, The Fourth Conference on Algebraic Combinatorics, November 2-3, 2011, Bu-Ali Sina University, Hamedan, Iran.
- *Integral trees of odd diameters*, Linear Algebraic Techniques in Combinatorics/Graph Theory, January 30–February 4, 2011, Banff, Canada.
- *Graphs with few eigenvalues*, The Second Conference on Algebraic Combinatorics, May 12-13, 2010, Ferdowsi University of Mashhad, Mashhad, Iran.
- *Hadamard Matrices and Their Applications*, One Day Seminar on Topics in Combinatorics, March 10, 2010, Shahid Rajaei Teacher Training University, Tehran, Iran.
- *Some constructions of integral graphs*, The First Conference on Algebraic Combinatorics, November, 2009, Tabriz, Iran.
- *Spectral characterization of some families of graphs*, Invariants of incidence matrices, March 29-April 3, 2009, Banff, Canada.
- *Spectral characterization of Hamming graphs*, SBU Combinatorics Day, March 4, 2009, Shahid Beheshti University, Tehran, Iran.
- *Hadamard Matrices*, Combinatorics Day, October 28, 2008, Zanjan University, Zanjan, Iran.
- *Complementary Sequences and Hadamard Matrices*, 37th Annual Iranian Mathematics Conference, September 2–5, 2006, Azarbaijan University of Tarbiat Moallem, Tabriz, Iran.
- *Construction and Classification of Combinatorial Designs by Computer Search*, IPM Combinatorics II: Design Theory, Graph Theory, and Computational Methods, April 22–27, 2006, IPM, Tehran, Iran.

## Papers

- [1] Z. Eslami and B. Tayfeh-Rezaie, On  $2-(v, 3)$  trades of minimum volume, *Australas. J. Combin.* **19** (1999), 239–251.
- [2] B. Tayfeh-Rezaie, Some infinite families of large sets of  $t$ -designs, *J. Combin. Theory Ser. A* **87** (1999), 239–245.
- [3] Z. Eslami, G. B. Khosrovshahi, and B. Tayfeh-Rezaie, On halvings of the  $2-(10, 3, 8)$  designs, *J. Statist. Plann. Inference* **86** (2000), 411–419.

- [4] G. B. Khosrovshahi, R. Naserasr, and B. Tayfeh-Rezaie, Ternary trades and their codes, *J. Statist. Plann. Inference* **95** (2001), 237–243.
- [5] G. B. Khosrovshahi and B. Tayfeh-Rezaie, A new proof of a classical theorem in design theory, *J. Combin. Theory Ser. A* **93** (2001), 391–396.
- [6] Z. Eslami, G. B. Khosrovshahi, and B. Tayfeh-Rezaie, On classification of 2-(8, 3) and 2-(9, 3) trades, *J. Combin. Math. Combin. Comput.* **38** (2001), 231–242.
- [7] G. B. Khosrovshahi and B. Tayfeh-Rezaie, A note on 3-factorizations of  $K_{10}$ , *J. Combin. Des.* **9** (2001), 379–383.
- [8] G. B. Khosrovshahi, M. Mohammad-Noori, and B. Tayfeh-Rezaie, Classification of 6-(14,7,4) designs with nontrivial automorphism groups, *J. Combin. Des.* **10** (2002), 180–194.
- [9] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Some results on the existence of large sets of  $t$ -designs, *J. Combin. Des.* **11** (2003), 144–151.
- [10] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Root cases of large sets of  $t$ -designs, *Discrete Math.* **263** (2003), 143–155.
- [11] M. Mohammad-Noori and B. Tayfeh-Rezaie, Backtracking algorithm for finding  $t$ -designs, *J. Combin. Des.* **11** (2003), 240–248.
- [12] H. Kharaghani and B. Tayfeh-Rezaie, Some new orthogonal designs in orders 32 and 40, *Discrete Math.* **279** (2004), 317–324.
- [13] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Some indecomposable  $t$ -designs, *Des. Codes Cryptogr.* **32** (2004), 235–238.
- [14] Ziba Eslami, G. B. Khosrovshahi, M. M-Noori and B. Tayfeh-Rezaie, Some new 4-designs, *Ars Combin.* **73** (2004), 225–229.
- [15] W. H. Holzmann, H. Kharaghani, Jennifer Seberry and B. Tayfeh-Rezaie, On orthogonal designs in order 48, *J. Statist. Plann. Inference* **128** (2005), 311–325.
- [16] B. Tayfeh-Rezaie, On the existence of large sets of  $t$ -designs of prime sizes, *Des. Codes Cryptogr.* **37** (2005), 143–149.
- [17] H. Kharaghani and B. Tayfeh-Rezaie, A Hadamard matrix of order 428, *J. Combin. Des.* **13** (2005), 435–440.
- [18] G. B. Khosrovshahi, R. Laue and B. Tayfeh-Rezaie, Large sets of  $t$ -designs of size four, *Bayreuth. Math. Schr.* No. **74** (2005), 136–144.
- [19] P. J. Cameron, G. R. Omid and B. Tayfeh-Rezaie, 3-Designs from  $\text{PGL}(2, q)$ , *Electron. J.*

*Combin.* **13**, 2006.

- [20] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Large sets of  $t$ -designs through partitionable sets: A survey, *Discrete Math.* **306** (2006), 2993–3004.
- [21] P. J. Cameron, M. R. Maimani, G. R. Omid, and B. Tayfeh-Rezaie, 3-Designs from  $\text{PSL}(2, q)$ , *Discrete Math.* **306** (2006), 3063–3073.
- [22] B. Tayfeh-Rezaie, Yet another quick proof that  $K_{10} \neq P + P + P$ , *Bull. Inst. Combin. Appl.* **48** (2006), 119–120.
- [23] S. Georgiou, W. H. Holzmann, H. Kharaghani and B. Tayfeh-Rezaie, Three variable full orthogonal designs of order 56, *J. Statist. Plann. Inference.* **137** (2007), 611–618.
- [24] N. Ghareghani, G. R. Omid and B. Tayfeh-Rezaie, Spectral characterization of graphs with index at most  $\sqrt{2 + \sqrt{5}}$ , *Linear Algebra Appl.* **420** (2007), 483–489.
- [25] G. R. Omid, M. R. Pournaki and B. Tayfeh-Rezaie, 3-Designs with block size 6 from  $\text{PSL}(2, q)$  and their large sets, *Discrete Math.* **307** (2007), 1580–1588.
- [26] R. Laue, G. R. Omid, B. Tayfeh-Rezaie and A. Wassermann, New large sets of  $t$ -designs with prescribed groups of automorphisms, *J. Combin. Des.* **15** (2007), 210–220.
- [27] W. H. Holzmann, H. Kharaghani and B. Tayfeh-Rezaie, Williamson matrices up to order 59, *Des. Codes Cryptogr.* **46** (2008), 343–352.
- [28] M. Behbahani, G. B. Khosrovshahi and B. Tayfeh-Rezaie, On the spectrum of simple  $T(2, 3, v)$  trades, *J. Statist. Plann. Inference* **138** (2008), 2236–2242.
- [29] W. H. Holzmann, H. Kharaghani and B. Tayfeh-Rezaie, All triples for orthogonal designs of order 40, *Discrete Math.* **308** (2008), 2796–2801.
- [30] H. Kharaghani and B. Tayfeh-Rezaie, On the energy of  $(0,1)$ -matrices, *Linear Algebra Appl.* **429** (2008), 2046–2051.
- [31] N. Ghareghani, F. Ramezani and B. Tayfeh-Rezaie, Graphs cospectral to starlike trees, *Linear Algebra Appl.* **429** (2008), 2691–1701.
- [32] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Trades and  $t$ -designs, in *Surveys in Combinatorics 2009* (eds. S. Huczynska, C. M. Roney-Dougal, J. D. Mitchell), *Lond. Math. Soc. Lecture Notes Ser.*, 365, Cambridge University Press, Cambridge (2009), pp 91–112.
- [33] G. B. Khosrovshahi and B. Tayfeh-Rezaie, Classification of simple 2- $(11,3,3)$  designs, *Discrete Math.* **309** (2009), 515–520.



- [34] F. Ramezani, N. Broojerdian and B. Tayfeh-Rezaie, A note on the spectral characterization of  $\theta$ -graphs, *Linear Algebra Appl.* **431** (2009), 626–632.
- [35] W.H. Haemers, A. Mohammadian and B. Tayfeh-Rezaie, On the sum of Laplacian eigenvalues of graphs, *Linear Algebra Appl.* **432** (2010), 2214–2221.
- [36] P. Rowlinson and B. Tayfeh-Rezaie, Star complements in regular graphs: old and new results, *Linear Algebra Appl.* **432** (2010), 2230–2242.
- [37] A. Mohammadian and B. Tayfeh-Rezaie, A short proof of a theorem of Bang and Koolen, *European J. Combin.* **31** (2010), 1461–1463.
- [38] H. Kharaghani and B. Tayfeh-Rezaie, On the classification of Hadamard matrices of order 32, *J. Combin. Des.* **18** (2010), 328–336.
- [39] A. Mohammadian and B. Tayfeh-Rezaie, The spectrum of the McKay-Miller-Siran graphs, Contemporary Mathematics, 531, American Mathematical Society, Providence, RI, 2010, pp. 197–199.
- [40] R. Laue, G. R. Omid and B. Tayfeh-Rezaie, Large sets of  $t$ -designs from  $t$ -homogeneous groups, *Ars Combin.* **97** (2010), 333–342.
- [41] F. Ayoobi, G. R. Omid and B. Tayfeh-Rezaie, A note on graphs whose signless Laplacian has three distinct eigenvalues, *Linear Multilinear Algebra* **59** (2011), 701–706.
- [42] A. Mohammadian and B. Tayfeh-Rezaie, Some constructions of integral graphs, *Linear Multilinear Algebra* **59** (2011), 1269–1279.
- [43] A. Mohammadian and B. Tayfeh-Rezaie, Graphs with four distinct Laplacian eigenvalues, *J. Algebraic Combin.* **34** (2011), 671–682.
- [44] E. Ghorbani, A. Mohammadian and B. Tayfeh-Rezaie, Integral trees of odd diameters, *J. Graph Theory* **70** (2012), 332–338.
- [45] E. Ghorbani, A. Mohammadian and B. Tayfeh-Rezaie, Maximum order of trees and bipartite graphs with a given rank, *Discrete Math.* **312** (2012), 3498–3501.
- [46] F. Ramezani and B. Tayfeh-Rezaie, Spectral characterization of some cubic graphs, *Graphs Combin.* **28** (2012), 869–876.
- [47] F. Ashraf, G. R. Omid and B. Tayfeh-Rezaie, On the sum of signless Laplacian eigenvalues of a graph, *Linear Algebra Appl.* **438** (2013), 4539–4546.
- [48] H. Kharaghani and B. Tayfeh-Rezaie, Hadamard matrices of order 32, *J. Combin. Des.* **21** (2013), 212–221.

- [49] F. Ashraf and B. Tayfeh-Rezaie, Nordhaus–Gaddum type inequalities for Laplacian and signless Laplacian eigenvalues, *Electron. J. Combin.* **21** (2014), #P3.6.
- [50] F. Ramezani and B. Tayfeh-Rezaie, Graphs with prescribed star complement for 1 as the second largest eigenvalue, *Ars Combin.* **116** (2014), 129-145.
- [51] A. Mohammadian and B. Tayfeh-Rezaie, On a family of diamond-free strongly regular graphs, *SIAM J. Discrete Math.* **28** (2014), 1906–1915.
- [52] E. Ghorbani, A. Mohammadian and B. Tayfeh-Rezaie, Maximum order of triangle-free graphs with a given rank, *J. Graph Theory* **79** (2015), 145–158.
- [53] B. Mohar and B. Tayfeh-Rezaie, Median eigenvalues of bipartite graphs, *J. Algebraic Combin.* **41** (2015), 899–909.
- [54] A. Mohammadian and B. Tayfeh-Rezaie, A note on Order and Eigenvalue Multiplicity of Strongly Regular Graphs, in: *Algebraic Design Theory and Hadamard Matrices*, (Charles Colbourn, Editor), Springer Proceedings in Mathematics & Statistics, 133, Springer, Cham, 2015, pp 209–212.
- [55] E. Ghorbani, A. Mohammadian and B. Tayfeh-Rezaie, Integral trees with given nullity, *Discrete Math.* **339** (2016), 157–164.
- [56] E. Ghorbani, A. Mohammadian and B. Tayfeh-Rezaie, On order and rank of graphs, *Combinatorica* **35** (2015), 655–668.
- [57] B. Mohar, A. Rafiey, B. Tayfeh-Rezaie and H. Wu, Interval minors of complete bipartite graphs, *J. Graph Theory* **82** (2016), 312–321.
- [58] A. Mohammadian and B. Tayfeh-Rezaie, Star saturation number of random graphs, *Discrete Math.* **341** (2018), 1166–1170.
- [59] A. Mohammadian and B. Tayfeh-Rezaie, Hadamard matrices with few distinct types, *Linear Multilinear Algebra* **67** (2019), 1596–1605.
- [60] A. Hanaki, H. Kharaghani, A. Mohammadian and B. Tayfeh-Rezaie, Classification of skew-Hadamard matrices of order 32 and association schemes of order 31, *J. Combin. Des.* **28** (2020), 421–427.
- [61] M.R. Bidgoli, A. Mohammadian and B. Tayfeh-Rezaie, Percolating sets in bootstrap percolation on the Hamming graphs and triangular graphs, *European J. Combin.* **92** (2021), 103256, 16 pp.
- [62] M.R. Bidgoli, A. Mohammadian and B. Tayfeh-Rezaie, On  $K_{2,t}$ -bootstrap percolation, *Graphs Combin.* **37** (2021), 731–741.

[63] S. Suda, H. Kharaghani and B. Tayfeh-Rezaie, Disjoint weighing matrices, *J. Algebraic Combin.* **55** (2022), 27–41.

•**To appear**

•**Submitted**

[64] M.R. Bidgoli, A. Mohammadian, B. Tayfeh-Rezaie and M. Zhukovskii, Threshold for weak saturation stability.

•**Preprints**

[65] M. Behbahani, G. B. Khosrovshahi and B. Tayfeh-Rezaie, Reed-Muller codes and incidence matrices.

**Lecture Notes**

B. Tayfeh-Rezaie, Lecture Notes on The Star Complement Technique, 2007, IPM.

G. B. Khosrovshahi and B. Tayfeh-Rezaie, Lecture Notes on Large Sets of  $t$ -Designs, 2003, IPM.