

ZHONGSHAN LI

Department of Mathematics and Statistics
Georgia State University
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Education

Ph.D., Mathematics, May 1990, North Carolina State University
Dissertation: The Embedding of Rings in Regular Rings and π -regular Rings
Advisors: Professors Jiang Luh and Mohan S. Putcha

M.Sc., Mathematics, June 1986, Beijing Normal University, China
Thesis: Principal Torsion Theory Rings
Advisor: Professor Shaoxue Liu

B.Sc., Mathematics, June 1983, Lanzhou University, China
Thesis: On the Decompositions of Formal Languages over a Free Monoid
Thesis advisor: Professor Yuqi Guo

Publications

D. Lin, X. Chen, **Z. Li**, B. Li, X. Yang, On the existence of the exact solution of quaternion-valued neural networks based on a sequence of approximate solutions, IEEE Transactions on Neural Networks and Learning Systems, 9 pp. In press.
DOI: <https://doi.org/10.1109/TNNLS.2021.3129269>

L. Zhang, G.-F. Mou, F. Liu, **Z. Li**, Some bounds of the generalized μ -scrambling indices of primitive digraphs with d loops. J. Inequal. Appl. (2021), Paper No. 128, 13 pp.
DOI: <https://doi.org/10.1186/s13660-021-02667-y>

D. Lin, X. Chen, G. Yu, **Z. Li**, Y. Xia, Global exponential synchronization via nonlinear feedback control for delayed inertial memristor-based quaternion-valued neural networks with impulses. Appl. Math. Comput. 401 (2021), Paper No. 126093, 19 pp.
DOI: <https://doi.org/10.1016/j.amc.2021.126093>

Y. Xia, X. Chen, D. Lin, **Z. Li**, Some dynamical behaviors of fractional-order commutative quaternion-valued neural networks via direct method of Lyapunov, IEEE Access 9 (2021), 693-708. DOI: <https://doi.org/10.1109/ACCESS.2020.3046842>

M. Arav, F.J. Hall, **Z. Li**, H. van der Holst, Two-connected signed graphs with maximum nullity at most two, Linear Algebra Appl. 611 (2021), 82-93.
DOI: <https://doi.org/10.1016/j.laa.2020.12.002>

B.-L. Yu, **Z. Li**, S. Xu, On the eventual exponential positivity of some tree sign patterns. *Symmetry* 13 (2021), 1669. DOI: <https://doi.org/10.3390/sym13091669>

X. Feng, W. Gao, F.J. Hall, G. Jing, **Z. Li**, C. Zagrodny, J. Zhou, Rank conditions for sign patterns that allow diagonalizability, *Discrete Mathematics* 343 (2020), no. 5, 111798, 11 pp. DOI: <https://doi.org/10.1016/j.disc.2019.111798>

G.F. Mou, T.F. Wang, **Z. Li**, The bipartite zero forcing set for a full sign pattern matrix, *Mathematics* 8 (3) (2020), 354, 14 pp. DOI: <https://doi.org/10.3390/math8030354>

W. Fang, H. Yu, Y. Gao, G. Jing, Z. Li, X. Li, Minimum detour index of cactus graphs. *Ars Combinatoria* 144 (2019), 293–307.

X. Chen, Q. Song, and **Z. Li**, Design and analysis of quaternion-valued neural networks for associative memories, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, Vol. 48, NO. 12, 2018, 2305-2314. DOI: <https://doi.org/10.1109/TSMC.2017.2717866>

W. Fang, W. Gao, Y. Gao, F. Gong, G. Jing, **Z. Li**, Y. Shao, L. Zhang, Minimum ranks of sign patterns and zero–nonzero patterns and point–hyperplane configurations, *Linear Algebra and its Applications* 558 (2018), 44-62. DOI: <https://doi.org/10.1016/j.laa.2018.08.019>

X. Chen, L. Li, **Z. Li**, Robust stability analysis of quaternion-valued neural networks via LMI approach, *Advances in Difference Equations* 2018 (1), Paper No.131, 20 pages. DOI: <https://doi.org/10.1186/s13662-018-1585-z>

X. Chen, Q. Song, **Z. Li**, Z. Zhao, Y. Liu, Stability analysis of continuous-time and discrete-time quaternion-valued neural networks with linear threshold neurons, *IEEE Transactions on Neural Networks and Learning Systems* 29 (7) (2018), 2769-2781. DOI: <https://doi.org/10.1109/TNNLS.2017.2704286>

W. Fang, H. Yu, Y. Gao, X. Li, G. Jing, Z. Li, Maximum Balaban index and sum-Balaban index of tricyclic graphs, *MATCH Commun. Math. Comput. Chem.* 79 (2018), no. 3, 717–742.

Z. Li, F. Zhang, X. Zhang, On the number of vertices of the stochastic tensor polytope, *Linear and Multilinear Algebra* 65 (2017), no. 10, 2064–2075. DOI: <https://doi.org/10.1080/03081087.2017.1310178>

W. Gao, **Z. Li**, Path sign patterns of order $n \geq 5$ do not require H_n , *Linear Algebra Appl.* 532 (2017), 99–126. DOI: <https://doi.org/10.1016/j.laa.2017.06.039>

X. Chen, **Z. Li**, Q. Song, J. Hu, Y. Tan, Robust stability analysis of quaternion-valued neural networks with time delays and parameter uncertainties, *Neural Networks* 91 (2017), 55–65. DOI: <https://doi.org/10.1016/j.neunet.2017.04.006>

- X. Chen, Q. Song, **Z. Li**, Design and analysis of quaternion-valued neural networks for associative memories, IEEE Transactions on Systems, Man, and Cybernetics: Systems PP (99) (2017), 1–10. DOI: <https://doi.org/10.1109/TSMC.2017.2717866>
- X. Chen, Q. Song, **Z. Li**, Z. Zhao, Y. Liu, Stability analysis of continuous-time and discrete-time quaternion-valued neural networks with linear threshold neurons, IEEE Transactions on Neural Networks and Learning Systems PP (99) (2017), 1–13. DOI: <https://doi.org/10.1109/tnnls.2017.2704286>
- F.J. Hall, **Z. Li**, C.T. Parnass, M. Rozložník, Sign patterns of J-orthogonal matrices, Special Matrices 5 (2017), 225–241. DOI: <https://doi-org/10.1515/spma-2017-0016>
- W. Fang, Y. Gao, K. Fan, **Z. Li**, The second largest Balaban index (sum-Balaban index) of unicyclic graphs, J. Math. Res. Appl. 37 (2017), no. 4, 391–403. DOI: <https://doi.org/10.3770/j.issn:2095-2651.2017.04.002>
- W. Gao, **Z. Li** and L. Zhang, Characterization of star sign patterns that require H_n , Linear Algebra and Its Applications 499 (2016), 43–65. DOI: <https://doi.org/10.1016/j.laa.2017.06.039>
- W. Fang, W. Gao, Y. Gao, F. Gong, G. Jing, **Z. Li**, Y. Shao, and L. Zhang, The minimum ranks of nonnegative sign patterns and convex polytopes, Czech. Math Journal 66 (141) (2016), no. 3, 895–911. DOI: <https://doi.org/10.1007/s10587-016-0299-1>
- M. Arav, F. Hall, **Z. Li**, H. van der Holst, A graph minors characterization of signed graphs whose Colin de Verdière parameter ν is two, Journal of Combinatorial Theory, Series B 116 (2016), 440–455. DOI: <https://doi.org/10.1016/j.jctb.2015.09.007>
- X. Chen, W. Fang, W. Gao, Y. Gao, G. Jing, **Z. Li**, Y. Shao, L. Zhang, Essential sign change numbers of full sign pattern matrices. Special Matrices 4 (2016), 247–254. DOI: <https://doi.org/10.1515/spma-2016-0023>
- W. Fang, Y. Gao, Y. Shao, W. Gao, G. Jing, **Z. Li**, Maximum Balaban index and sum-Balaban index of bicyclic Graphs, MATCH Communications in Math. and in Computer Chemistry 75 (2016), 129–156.
- W. Fang, Y. Gao, Y. Shao, W. Gao, G. Jing, **Z. Li**, The generalized competition indices of primitive minimally strong digraphs, Linear Algebra and Its Applications 493 (2016), 206–226. DOI: <https://doi.org/10.1016/j.laa.2015.11.036>
- W. Gao, **Z. Li**, L. Zhang, Sign patterns that require H_n exist for each $n \geq 4$, Linear Algebra and Its Applications 489 (2016), 15–23. DOI: <https://doi.org/10.1016/j.laa.2015.09.050>
- M. Arav, F. Hall, **Z. Li**, H. van der Holst, J.H. Sinkovic, L. Zhang, Minimum ranks of sign patterns via sign vectors and duality, Electronic Journal of Linear Algebra 30 (2015), 360–371. DOI: <https://doi.org/10.13001/1081-3810.3077>

- M. Fiedler, W. Gao, F.J. Hall, G. Jing, **Z. Li**, M. Stroeve, Ranks of dense alternating sign matrices and their sign patterns, Linear Algebra and Its Applications 471 (2015), 109–121. DOI: <https://doi.org/10.1016/j.laa.2014.12.034>
- J. Luo, T-Z. Huang, H. Li, **Z. Li**, L. Zhang, Tree sign patterns that allow nilpotence of index 4, Linear Multilinear Algebra 63 (2015), no. 5, 1009–1025. DOI: <https://doi.org/10.1080/03081087.2014.914930>
- W. Gao, **Z. Li**, and L. Zhang, The minimal critical sets of refined inertias for 3×3 full sign patterns, Linear Algebra and Its Applications 458 (2014), 183–196. DOI: <https://doi.org/10.1016/j.laa.2014.06.009>
- M. Arav, F. Hall, **Z. Li**, W. Zhou, and L. Zhang, The minimum rank of a sign pattern with a 1-separation, Linear Algebra and Its Applications 448 (2014), 205–216. DOI: <https://doi.org/10.1016/j.laa.2014.01.019>
- L. Zhang, **Z. Li**, T.Z. Huang, Q.F. Zhu, J. Hua, L.H. Zhang, Periodic, reducible, powerful ray pattern matrices, Linear Algebra and Its Applications 444 (2014), 81–88. DOI: <https://doi.org/10.1016/j.laa.2013.11.007>
- L. Zhang, T.Z. Huang, **Z. Li** and J.Y. Zhang, Several spectrally arbitrary ray patterns, Linear and Multilinear Algebra 61 (2013), 543–564. <https://doi.org/10.1080/03081087.2012.696247>
- Z. Li**, Y. Gao, M. Arav, F. Gong, W. Gao, F.J. Hall and H. van der Holst, Sign patterns with minimum rank 2 and upper bounds on minimum ranks, Linear and Multilinear Algebra 61 (2013), 895–908. DOI: <https://doi.org/10.1080/03081087.2012.716431>
- M. Arav, F. Hall, **Z. Li** and H. van der Holst, The inertia set of a signed graph, Linear Algebra and Its Applications 439 (2013), 1506–1529. DOI: <https://doi.org/10.1016/j.laa.2013.04.032>
- X. Feng, T.Z. Huang, **Z. Li**, J. Luo and Y. Gao, Sign patterns that allow diagonalizability revisited, Linear and Multilinear Algebra 61 (2013), 1223–1233. DOI: <https://doi.org/10.1080/03081087.2012.746329>
- F. Hall and **Z. Li**, Sign pattern matrices, Chapter 42 in L. Hogben (Ed.), Handbook of Linear Algebra, 2nd edition, Chapman/Hall CRC Press, 2013. DOI: <https://doi.org/10.1201/b16113>
- Y. Shao, Y. Gao and **Z. Li**, The m -competition indices of symmetric primitive digraphs without loop, Electronic Journal of Linear Algebra 23 (2012), 457–472. DOI: <https://doi.org/10.13001/1081-3810.1532>
- X. Feng, **Z. Li** and T.Z. Huang, Is every nonsingular matrix diagonally equivalent to a matrix with all distinct eigenvalues? Linear Algebra and Its Applications 436 (2012), 120–125.

- L. Zhang, T.Z. Huang, and **Z. Li**, Primitive zero-symmetric sign pattern matrices with zero diagonal attaining the maximum base, Journal of Applied Math **2012** (2012), Article ID 276386, 28 pages, doi 10.1155/2012/276386.
- M. Arav, F. Hall, **Z. Li**, K. Kaphle and N. Manzagol, Spectrally arbitrary tree sign patterns of order 4, Electronic Journal of Linear Algebra **20** (2010), 180-197.
- M. Arav, F. Hall, **Z. Li**, A. Merid and Y. Gao, Sign patterns that require almost unique rank, Linear Algebra and Its Applications **430** (2009), 7-16.
- M. Arav, F. Hall, **Z. Li** and B. Rao, ZPC matrices and zero cycles, International Journal of Combinatorics **2009** (2009), 1-5.
- M. Arav, F. Hall, **Z. Li** and B. Rao, Rational solutions of certain matrix equations, Linear Algebra and Its Applications **430** (2009), 660-663.
- M. Arav, F. Hall and **Z. Li**, A Cauchy-Schwarz inequality for triples of vectors, Mathematical Inequalities and Applications **11** (2008), 629-634.
- Y. Gao, **Z. Li** and Y. Shao, A note on spectrally arbitrary sign patterns, JP Journal of Algebra, Number Theory and Applications **11** (2008), 15-35
- T. Huang, G. Mou, G. Tian, **Z. Li**, D. Wang, Subdirect sums of P (P_0)-matrices and totally nonnegative matrices, Linear Algebra and Its Applications **429** (2008), 1730-1743.
- Y. Gao, **Z. Li** and Y. Shao, Sign patterns allowing nilpotence of index 3, Linear Algebra and Its Applications **424** (2007), 55-70.
- F. Hall and **Z. Li**, Sign pattern matrices, Chapter 33 in L. Hogben (Ed.), Handbook of Linear Algebra, Chapman and Hall/CRC Press, 2007.
- M. Arav, F. Hall, S. Koyuncu, **Z. Li** and B. Rao, Rational realizations of the minimum rank of a sign pattern matrix, Linear Algebra and Its Applications **411** (2005), 111-125.
- Z. Li**, F. Hall and J. Stuart, Reducible powerful ray pattern matrices, Linear Algebra and Its Applications **399** (2005), 125-140.
- G. Chen, G. Davis, F. Hall, **Z. Li**, K. Patel, M. Stewart, An interlacing result on normalized Laplacians, SIAM Journal on Discrete Mathematics **18** (2004), 353-361.
- F. Hall, **Z. Li** and B. Rao, From Boolean to sign pattern matrices, Linear Algebra and Its Applications **393** (2004), 233-51.
- G. Chen, F. Hall, **Z. Li** and B. Wei, On ranks of matrices associated with trees, Graphs and Combinatorics **19** (2003), 323-334.
- F. Hall and **Z. Li**, Sign Patterns, Inverses and generalized inverses — a brief survey,

Numerical Mathematics: A Journal of Chinese Universities **12** (Supplement) (2003), 8-11.

G. Chen, F. Hall, **Z. Li** and B. Wei, On ranks of matrices associated with trees, Numerical Mathematics: A Journal of Chinese Universities **12** (Supplement) (2003), 76 – 79.

Z. Li and L. Harris, Sign patterns that require all distinct eigenvalues, JP Journal of Algebra and Number Theory and Applications **2** (2) (2002), 161-179.

Z. Li, F. Hall and J. Stuart, Irreducible powerful ray pattern matrices, Linear Algebra and its Applications **342** (2002), 47-58.

F. Hall and **Z. Li**, Inertia sets of sign patterns, Numerical Mathematics: A Journal of Chinese Universities **10** (2001), 226-240.

F. Hall, **Z. Li** and Di Wang, Symmetric sign pattern matrices that require unique inertia, Linear Algebra and Its Applications **338** (2001), 153-169.

G. Chen, F. Hall, **Z. Li** and H. Zhou, Isomorphisms involving reversing arcs of di-graphs, Journal of Combinatorial Mathematics and Combinatorial Computing **36** (2001), 155--160.

C. Eschenbach, F. Hall, R. Hemasinha, S. Kirkland, **Z. Li**, B. Shader, J. Stuart and J. Weaver, Properties of almost regular tournaments, American Mathematical Monthly **107** (no.10) (2000), 881-892.

C. Eschenbach, F. Hall and **Z. Li**, Eigenvalue distribution of certain ray patterns, Czechoslovak Mathematical Journal **50**(125) (2000), 749-762.

C. Eschenbach, F. Hall, R. Hemasinha, S. Kirkland, **Z. Li**, B. Shader, J. Stuart and J. Weaver, On almost regular tournament matrices, Linear Algebra and Its Applications **306** (2000), 103--121.

C. Eschenbach and **Z. Li**, Potentially nilpotent sign pattern matrices, Linear Algebra and Its Applications **299** (1999), 81-99.

F. Hall and **Z. Li**, Sign patterns of idempotent matrices, Journal of Korean Mathematical Society **36** (1999), 469-487.

C. Eschenbach, F. Hall, D. Harrell and **Z. Li**, When does the inverse have the same sign pattern as the transpose?, Czechoslovak Mathematical Journal **49**(124) (1999), 255-275.

C. Eschenbach, F. Hall and **Z. Li**, From real to complex sign pattern matrices, Bulletin of the Australian Mathematical Society **57** (1998), 159-172.

C. Eschenbach, F. Hall, C. Johnson and **Z. Li**, The graphs of unambiguous entries in the product of two (+,-) sign patterns, Linear Algebra and Its Applications

260 (1997), 95-118.

C. Eschenbach and **Z. Li**, How many negative entries can A^2 have?, Linear Algebra and Its Applications **254** (1997), 99-117.

Z. Li, F. Hall and F. Zhang, Sign patterns of nonnegative normal matrices, Linear Algebra and Its Applications **254** (1997), 335-354.

C. Eschenbach, F. Hall and **Z. Li**, Some sign patterns that allow an inverse pair B and B^{-1} , Linear Algebra and Its Applications **252**(1997), 299-321.

Z. Li, F. Hall and C. Eschenbach, The structure of nonnegative cyclic matrices, Linear and Multilinear Algebra **41** (1996), 23-33.

Z. Li, F. Hall and C. Eschenbach, On the period and base of a sign pattern matrix, Linear Algebra and Its Applications **212** (1994), 101-120.

C. Eschenbach, F. Hall and **Z. Li**, Eigenvalue frequency and consistent sign pattern matrices, Czechoslovak Mathematical Journal **44** (1994), 461-479.

C. Eschenbach, F. Hall and **Z. Li**, Sign pattern matrices and generalized inverses, Linear Algebra and Its Applications **211** (1994), 53-66.

Z. Li, A determinantal description of GCD-closed sets and k -sets, Linear and Multilinear Algebra **31** (1992), 245-250.

Z. Li, The determinants of GCD matrices, Linear Algebra and Its Applications **134** (1990), 137-143.

Work in Progress

M. Arav, F. Hall, Z. Li, et al., Full sign patterns that allow normality, in progress.

M. Rozloznik, F.J. Hall, Z. Li, M. Stewart, M. Stroeve, Eigenvalues of generalized complementary basic matrices with idempotent generators. In preparation.

Y. Gao, Z. Li, V. Bailey, F. Hall, and P. Kim, Irreducible sign patterns of order 4 that require four distinct eigenvalues. In preparation.

Professional Experience

August 2007 – Present, Professor, Graduate Director (2010-2015, 2019-Present), Department of Mathematics and Statistics, Georgia State University.

August 1998 – July 2007, Associate Professor, Department of Mathematics and Statistics, Georgia State University.

September 1992 - July 1998, Assistant Professor, Department of Mathematics and Computer Science, Georgia State University.

September 1991 - August 1992, Instructor, Department of Mathematics and Computer Science, Georgia State University.

August 1990 - May 1991, Visiting Instructor, Department of Mathematics, North Carolina State University.

January 1987 - May 1990, Graduate Teaching Assistant, Department of Mathematics, North Carolina State University.

July 1986 - December 1986, Assistant Professor, Department of Mathematics, Hebei Normal College, Shijiazhuang, China.

September 1984 - May 1986, Graduate Teaching Assistant, Department of Mathematics, Beijing Normal University, Beijing, China.

Research Interests

Combinatorial Matrix Theory, Sign Pattern Matrices, Nonnegative Matrices, Integer Matrices, Oriented Matroids, Convex Polytopes, Boolean Matrices, Matrix Theory Applications, Polynomial and Matrix Equations, Matrix Inequalities, Algebraic Graph Theory, Neural Networks

Grant Activities

International Collaboration Travel Grant, Chongqing Jiaotong University, RMB 50,000, 2020–2023.

PI of conference grant proposal “Workshop on matrix theory and applications”, submitted to NSA in October of 2019., \$21,300. Not funded.

Summer Research Grant, Dept. of Math/Stat, GSU, \$1000-\$2000/year, 2005–2015, 2017-2019.

PI of the grant proposal “Minimum ranks of sign pattern matrices” submitted to NSF in September of 2018, \$202,000. Not funded.

PI of the grant proposal “Minimum ranks of sign pattern matrices” submitted to NSF in 2017, \$239,000. Received good to very good reviews. Not funded.

PI of the grant proposal “Research on some important problems in combinatorial matrix theory” submitted to Simons Foundation in January, 2018, \$42,000. Not funded.

PI of Applied Combinatorics Research Grant from Shanxi Province and North University of China, 800,000RMB (\approx \$125,000), January 2012 – December 2014.

Co-Project Director of a GAANN (Graduate Assistance in Areas of National Need) grant proposal, submitted to the U.S. Department of Education, May 2015. \$586,000. Received a rating of 86/100. Not funded.

Summer Research Grant, Dept. of Math/Stat, GSU, \$1000-\$2000/year, 2005–2015, 2017–2019.

PI of the grant proposal “Oriented matroids and minimum ranks of sign pattern matrices”, submitted to NSA in 2014. \$55,000. Received good to excellent reviews. Not funded

PI of the grant proposal “Minimum ranks of sign pattern matrices and sign graphs”, submitted to NSA in 2011. \$215,000. Received good to excellent reviews. Not funded.

Co-PI of the grant proposal “Some problems on minimum rank of sign pattern matrices and signed graphs” submitted to NSA in 2010. \$173,000. Received good to excellent reviews. Not funded.

PI of the grant proposal “Some Problems on Matrices and Graphs” submitted to NSA, Oct. 2004. Received excellent and very good reviews. Placed in “possibly fund” category.

Awarded generous support from Tongji University and Prof. Jiayu Shao’s research grant for my visits there in 2004 and 2006. The support included lodging, meals, local transportation and trip to Urumqi to attend a conference.

Obtained grant: GSU Directed Research Funds-Collaborative and Interdisciplinary Research, \$10,000, 1993-1994. The co-PIs were Professors M. Bakonyi, C. Eschenbach, F. Hall and Z. Li. The grant enabled the co-principal investigators to have release time for research, and to exchange visits with Professor Charles Johnson of the College of William and Mary.

Participated in an NSF grant proposal, IPCURT (**I**ntegrating **P**edagogical and **C**urriculum **T**heory with **T**eaching **P**ractices), led by Professor Dubinsky. Implemented the recommendations made by the NSF sponsored Linear Algebra Curriculum Study Group. The proposal was funded in 1998.

Conference Talks

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, invited talk at the 2021 China-Korea-USA Int'l Conference on Matrix Theory and Applications, 6th Int'l Conference on Matrix Equations and Matrix Inequalities, Hainan Normal University and Shanghai University, held online, November 26--27, 2021.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, invited talk at the 5th Xian International Workshop on Graph Theory and Combinatorics Northwestern Polytechnical University, Xian, held online, June 26--29, 2021

Digraphs and sign patterns that require all distinct eigenvalues, invited talk at the “Inverse Eigenvalue Problems for Matrices with a Given Graph, Digraph or Sign-pattern” Minisymposium of the 2021 SIAM Conference on Applied Linear Algebra, May 17-21, 2021

Irreducible sign patterns that require all distinct eigenvalues, invited talk at the 2019 International Workshop on Matrices and Operators, Nankai University, Tianjin, China, July 23-27, 2019.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, invited talk at the 5th International Conference on Matrix Inequalities and Matrix Equations, Guilin, China, June 7-10, 2019.

Sign pattern matrices that allow diagonalizability, invited talk at the 1146th American Math Society Meeting, Auburn, Alabama, March 15-17, 2019.

Diagonalizable matrices and cycle structures of their digraphs, invited talk at the 50th Southeastern International Conference on Combinatorics, Graph Theory, & Computing, Florida Atlantic University, Boca Raton, Florida, March 4-8, 2019.

Essential sign change numbers and minimum ranks of sign patterns, invited talk at the 2018 International Workshop on Matrices and Operators, Shanghai University, Shanghai, China, July 15 – 18, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, invited talk at Frontiers of Algebra Workshop, Southeast University, Nanjing, China, June 15 – 18, 2018.

Sign patterns that allow diagonalization, invited talk at the International Conference on Matrix Inequalities and Matrix Equations, Shanghai University, Shanghai, June 7 – 10, 2018.

Recent progress on sign patterns that allow diagonalizability, invited talk at the 2017 Korea-China International Conference on Matrix Theory with Applications, Sungkyunkwan University, Suwon, Korea, December 14-17, 2017.

Sign patterns that allow diagonalizability, invited talk at the Combinatorial Matrix Theory Session of the 2017 International Linear Algebra Society Conference, Iowa State University, July 24-28, 2017.

Essential sign change numbers of full sign patterns, invited talk at the Special Session on Matrices and Graphs, Joint Mathematics Meetings, Atlanta, Jan. 4-7, 2017.

Rational realization of the minimum ranks of nonnegative sign pattern matrices, invited talk at the Special Session on Combinatorial Matrix Theory, AMS Regional Meeting, Minneapolis, Oct. 28-30, 2016.

Point-hyperplane configurations and minimum ranks of sign patterns, invited talk at the conference Recent Advances in Linear Algebra and Graph Theory, University of Tennessee,

Chattanooga, March 5-6, 2016.

Oriented matroids and minimum ranks of sign pattern matrices, invited talk at the 5th International Conference on Matrix Analysis and Applications, Nova Southeastern University, Fort Lauderdale, Dec. 17-20, 2015

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, invited talk at the 2015 International Workshop on Matrices and Operators, Shaanxi Normal University, Xian, China, July 19-21, 2015.

Ranks of dense alternating sign matrices and their sign patterns, invited talk at the 2015 Shanghai International Workshop on Matrix Inequalities and Matrix Equations, Shanghai University, Shanghai, China, June 28-30, 2015.

Sign vectors of subspaces and minimum ranks of sign patterns, invited talk at the Minisymposium on Sign Patterns at the 2014 International Linear Algebra Society Conference, Seoul, Korea, August 6-9, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, invited talk at the 2014 International Workshop on Matrices and Operators, Haikou, China, July 24-27, 2014.

Minimum ranks of nonnegative sign patterns and polytopes, invited talk at the 2013 International Workshop on Matrices and Operators, Beijing Normal University, July 2013.

Sign patterns and point-hyperplane configurations, invited talk at the 2013 International Workshop on Graphs and Matrices, North University of China, Taiyuan, China, July 2013.

Sign patterns with minimum rank 3, invited talk at the International Workshop on Graph and Combinatorics, Anhui University, Hefei, China, June 2013.

Polytopes and nonnegative sign patterns, invited plenary talk at the 7th Cross Strait Conference on Graph Theory and Combinatorics, Changsha, China, June 2013.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, invited talk at the Special Session on Sign Pattern Matrices at the 2013 International Linear Algebra Society Conference, Providence, June 2013.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, invited talk at the 2012 Workshop on Matrices and Operators, Harbin, China, July 2012.

Sign vectors, duality and minimum ranks, invited talk at the 10th International Conference on Matrix Theory and Its Applications, Guiyang, China, July 2012.

Sign patterns that require all distinct eigenvalues, invited talk at the Combinatorial Matrix Theory Session of Summer 2011 Canadian Mathematical Society Conference, Alberta, Canada, June 2011.

4 by 4 irreducible sign patterns that require all distinct eigenvalues, invited talk at 3rd International Workshop on Matrices and Applications, LinAn, China, July 2009.

Sign patterns that require almost unique rank, invited talk at the 8th China International Matrix Theory Conference, Taiyuan, China, July 2008.

Inertially arbitrary sign pattern matrices, contributed talk at the 14th International Linear Algebra Society Conference, Shanghai University, Shanghai, China, July 2007.

Spectrally arbitrary tree sign pattern matrices, invited talk at Robert C. Thompson Matrix Meeting 2007, Auburn, March 2007.

Rational realizations of minimum ranks of sign patterns, invited talk at the 7th China International Matrix Theory Conference, Chengdu, July 2006.

Sign patterns that almost require a unique rank, invited talk at a special session of the AMS Central Regional Meeting, Lincoln, Oct. 2005.

Rational realizations of minimum ranks of sign patterns, invited talk at the Mini-symposium “Spectral Properties of Families of Matrices Described by Patterns or Graphs”, Twelfth International Linear Algebra Society Conference, Regina, Canada, June 2005.

Can the minimum rank of a sign pattern always be achieved by a rational matrix? Brualdi-fest: Linear Algebra, Graph Theory and Combinatorics, University of Wisconsin at Madison, May 2005.

Powerful ray pattern matrices, invited talk at the First National Conference on Graph Theory and Combinatorics, Urumqi, Xinjiang, China, August 2004.

Minimum ranks of sign pattern matrices, invited talk at Workshop on Combinatorial Matrix Theory, Banff International Research Station, Banff, Canada, May 2004.

Reducible powerful ray pattern matrices, invited talk at International Conference on Matrix Analysis and Applications, Fort Lauderdale, Dec. 2003.

Powerful ray pattern matrices, invited talk at Integers Conference on Combinatorics and Number Theory, State University of West Georgia, Carrollton, Oct. 2003.

Inertia sets of symmetric sign pattern matrices, invited talk at Mid Atlantic Algebra Conference (in honor of Drs. Luh and Koh), Raleigh, November 2002.

Sign patterns, inverses, and generalized inverses, invited talk at Fifth China Matrix Theory Conference, Shanghai, China, August 2002.

Sign patterns that require all distinct eigenvalues, contributed talk at the Tenth International Linear Algebra Society Conference, Auburn, June 2002.

Sign patterns that require all distinct eigenvalues, invited talk at the 2002 Southeastern Regional Conference of the American Mathematical Society, Atlanta, March 2002.

On the inertia sets of symmetric sign pattern matrices, invited talk at the International Conference on Combinatorial Matrix Theory, Pohang, Korea, January 2002.

The inertia sets of certain symmetric sign pattern matrices, 2001 Southeastern Regional Conference of the American Mathematical Society, Chattanooga, October 2001.

On almost regular tournament matrices, invited talk at Fourth China International Matrix Theory Conference, Kunming, China, August 2000.

Sign patterns that require all distinct eigenvalues, invited talk at the Fourth China Matrix Theory International Conference, Kunming, China, August 2000.

Determinantal identities for certain almost regular tournament matrices, Eighth Conference of the International Linear Algebra Society, Barcelona, Spain, July 1999.

Inertias of symmetric matrices with a fixed sign pattern, invited talk at the Seventh International Workshop on Matrices and Statistics, Fort Lauderdale, December 1998.

Sign patterns that allow nilpotence, invited plenary talk at the Third Chinese Matrix Theory Conference, Zhangjiajie, China, August 1998.

A survey of combinatorial matrix theory, invited talk at the Third Chinese Matrix Theory Conference, Zhangjiajie, China, August 1998.

Potentially nilpotent sign patterns, Seventh Conference of the International Linear Algebra Society, Madison, June 1998.

Unambiguous entries in the product of two sign patterns, Sixth Conference of the International Linear Algebra Society, Chemnitz, Germany, August 1996

Sign patterns of orthogonal matrices, 1995 Southern California Matrix Theory Conference, San Diego, November 1995.

Nonnegative normal matrices, Fifth International Linear Algebra Conference, Georgia State University, Atlanta, August 1995.

The structure of nonnegative cyclic matrices, invited talk at the 1994 Southern California Matrix Theory Conference, Salt Lake City, November 1994.

Nonnegative cyclic matrices, First Southeastern Linear Algebra Conference, Chattanooga, May 1994.

Sign patterns that allow an inverse pair, Second Symposium on Matrix Analysis, Kalamazoo, September 1993.

The period and base of a sign pattern matrix, Third ILAS Conference, Pensacola, March 1993.

Determinantal description of GCD-closed sets and k -sets, Joint Mathematics Meetings, San Francisco, January 1991.

Invited Colloquium/Seminar Talks

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Shanghai University, Shanghai, July 26, 2019.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, Taiyuan University of Technology, Taiyuan, China, July 19, 2019.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, North University of China, Taiyuan, China, July 18, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Taiyuan Normal University, Taiyuan, China, July 17, 2019.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, Xian Jiaotong University, Xian, China, July 8, 2019

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Xian University of Science and Technology, Xian, China, July 8, 2019

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Southwest Jiaotong University, Chengdu, China, July 2, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, University of Electronic Science and Technology of China, Chengdu, China, July 2, 2019.

Irreducible sign patterns that require all distinct eigenvalues, Sichuan University, Chengdu, China, July 1, 2019.

Minimum rank and cycle conditions for sign patterns that allow diagonalizability, Chongqing Jiaotong University, Chongqing, China, June 26, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Chongqing University of Posts and Telecommunications, Chongqing, China, June 26, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Jiangxi Normal University, Nanchang, China, June 24, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Nanchang University, Nanchang, China, June 24, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Xiangtan University, Xiangtan, China, June 20, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Hunan University, Changsha, China, June 19, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Hunan Normal University, Changsha, China, June 19, 2019.

Irreducible sign patterns that require all distinct eigenvalues, Gannan Normal University, Ganzhou, China June 14, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Jiangxi University of Science and Technology, Ganzhou, China June 13, 2019.

Irreducible sign patterns that require all distinct eigenvalues, Shanghai University, Shanghai, China, June 13, 2019.

Irreducible sign patterns that require all distinct eigenvalues, Nova Southeastern University, Fort Lauderdale, Florida, March 1, 2019.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Shanghai Jiao Tong University, Shanghai, July 22, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Tongji University, Shanghai, July 18, 2018.

Sign patterns that allow diagonalizability, Lanzhou University, Lanzhou, China, July 13, 2018.

Sign patterns that allow diagonalizability, Northwest Normal University, Lanzhou, China, July 10, 2018.

Sign patterns that allow diagonalizability, Heilongjiang University, Harbin, China, July 6, 2018.

Sign patterns that allow diagonalizability, Harbin Engineering University, Harbin, China, July 5, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Shandong University, Jinan, China, July 2, 2018.

Sign patterns that allow diagonalizability, Jinan University, Jinan, China, June 29, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Linyi University,

Linyi, June 26, 2018.

Sign patterns that allow diagonalizability, Linyi University, Linyi, China, June 25, 2018.

Sign patterns that allow diagonalizability, China Petroleum University, Qingdao, China, June 22, 2018.

Sign vectors of subspaces of \mathbb{R}^n and minimum ranks of sign patterns, Ocean University of China, Qingdao, China, June 21, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Nanjing Agricultural University, Nanjing, China, June 18, 2018.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Shanghai University, Shanghai, June 11, 2018.

Sign patterns that allow diagonalizability, Shanghai University, Shanghai, Dec. 11, 2017.

Essential sign change numbers and minimum ranks of sign pattern matrices, Shanghai University, Shanghai, China, Dec. 12, 2017.

Sign patterns matrices that ensure certain spectral properties, Lanzhou University, Lanzhou, China, Aug. 4, 2016.

Sign patterns matrices that ensure certain spectral properties, Northwest Normal University, Lanzhou, China, Aug. 2, 2016.

Convex polytopes and minimum ranks of nonnegative sign pattern matrices, Northwest Polytechnic University, Xian, China, July 16, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Northwest Polytechnic University, Xian, China, July 14, 2015.

Sign vectors of subspaces of \mathbb{R}^n and minimum ranks of sign pattern matrices, Northwest Polytechnic University, Xian, China, July 13, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Northwest Normal University, Lanzhou, China, July 8, 2015.

Ranks of dense alternating sign matrices and their sign patterns, Lanzhou University, Lanzhou, China, July 7, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Lanzhou University of Technology, Lanzhou, China, July 6, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Shanghai University of International Business and Economics, Shanghai,

China, July 2, 2015.

Sign vectors of subspaces of R^n and minimum ranks of sign pattern matrices, Shanghai University, Shanghai, July 2, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Shanghai University, Shanghai, China, July 1, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Taiyuan University of Technology, Taiyuan, China, June 25, 2015.

Minimum ranks of sign patterns and zero-nonzero patterns and point-hyperplane configurations, Tsinghua University, Beijing, June 23, 2015.

Sign vectors of subspaces of R^n and minimum ranks of sign pattern matrices, Beijing Normal University, Beijing, June 22, 2015.

Sign vectors of subspaces of R^n and minimum ranks of sign pattern matrices, Heilongjiang University, Harbin, China, June 19, 2015.

Convex polytopes and minimum ranks of nonnegative sign patterns, Harbin Engineering University, Harbin, China, June 18, 2015.

Characterization of sign patterns with minimum rank 2, Harbin Engineering University, Harbin, China, June 16, 2015.

Sign vectors of subspaces and minimum ranks of sign patterns, University of North Carolina, Charlotte, Nov. 21, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, State University of New York, Binghamton, New York, Nov. 18, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, Northwest Normal University, Lanzhou, July 22, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, Lanzhou University, Lanzhou, July 18, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, Central China Normal University, Wuhan, July 12, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, Shanghai Jiaotong University, Shanghai, July 9, 2014.

Sign vectors of subspaces and minimum ranks of sign patterns, Fudan University, Shanghai, July 8, 2014.

Four lectures on minimum ranks of sign patterns and oriented matroids, Shanghai University, Shanghai, July 1-7, 2014.

Minimum ranks of sign patterns and sign vectors of subspaces, Nankai University, Tianjin, June 27, 2014.

Sign pattern matrices—a branch of combinatorial matrix theory, Heilongjiang University, Harbin, June 24, 2014

Four lectures on minimum ranks of sign patterns and oriented matroids, Harbin Engineering University, Harbin, June 18-25, 2014.

Five lectures on minimum ranks of sign patterns and oriented matroids, North University of China, Taiyuan, June 9-16, 2014.

Minimum ranks of sign patterns via sign vectors and duality, University of Tennessee, Chattanooga, May 2, 2014.

Minimum ranks of sign patterns and sign vectors of subspaces of \mathbb{R}^n , University of Wisconsin, Madison, April 14, 2014.

Sign vectors of subspaces of \mathbb{R}^n and minimum ranks of sign patterns, Auburn University, Auburn, March 7, 2014.

Polytopes and minimum ranks of sign patterns, Lanzhou University, Lanzhou, China, August 2013.

Minimum ranks of nonnegative sign patterns and polytopes, North University of China, June 2013.

Sign patterns with minimum rank 3 and point--line configurations, North University of China, Taiyuan, China, June 2013.

Survey of sign pattern matrices, University of Science and Technology of China, Hefei, June 2013.

Sign patterns with minimum rank 3 and point--line configurations, University of Electronic Science and Technology of China, Chengdu, June 2013.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, Lanzhou University, Lanzhou, July 26, 2012.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, North University of China, Taiyuan, June 11, 2012.

Sign vectors, duality and minimum ranks, North University of China, Taiyuan, June 14, 2012.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, Shanghai Jiaotong University, Shanghai, June 21, 2012.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, East China Normal University, Shanghai, June 19, 2012.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, Tongji University, Shanghai, June 20, 2012.

Sign patterns with minimum rank 2 and upper bounds on the minimum ranks, University of Electronic Science and Technology of Chengdu, June 26, 2012.

Spectrally arbitrary sign patterns, Shanghai Jiaotong University, July 26, 2010.

The field of values of matrices, Lanzhou University, Lanzhou, July 24, 2010.

Sign pattern matrices that require all distinct eigenvalues, Lanzhou University, July 21, 2010.

Spectrally arbitrary sign patterns, Lanzhou University, July 20, 2010.

Foundations of sign pattern matrices, Lanzhou University, July 19, 2010.

Sign pattern matrices that require all distinct eigenvalues, University of Electronic Science and Technology, Chengdu, July 12, 2010.

Spectrally arbitrary sign patterns, University of Electronic Science and Technology, Chengdu, July 13, 2010.

The numerical range of a matrix, University of Electronic Science and Technology, Chengdu, July 13, 2010.

Sign pattern matrices: a branch of combinatorial matrix theory, Center of Combinatorial Mathematics, Fuzhou University, Fuzhou, July 7, 2010.

Sign pattern matrices that require all distinct eigenvalues, Chinese Academy of Sciences, Beijing, July 2, 2010.

Spectrally arbitrary sign patterns, Beijing University, July 2, 2010.

Boolean matrix factorizations, University of Electronic Science and Technology, Chengdu, January 2010

4 by 4 irreducible sign patterns that require all distinct eigenvalues, Shanghai Jiaotong University, July 2009

Spectrally arbitrary tree sign patterns of order 4, University of Electronic Science and

Technology, Chengdu, July 2009

4 by 4 irreducible sign patterns that require all distinct eigenvalues, University of Electronic Science and Technology, Chengdu, July 2009

4 by 4 irreducible sign patterns that require all distinct eigenvalues, Lanzhou University, July 2009

Sign pattern matrices, Lanzhou University, July 2009

Rational solutions of certain matrix equations, Lanzhou University, July 2009

Sign pattern matrices, Emory University, Atlanta, December 2008

Sign pattern matrices, Shanghai Jiaotong University, Shanghai, September 2008

Sign pattern matrices, East China Normal University, Shanghai, September 2008

Sign pattern matrices, Xiangtan University, Xiangtan, September 2008

Sign pattern matrices and digraphs, Changsha University of Science and Technology, Changsha, September 2008

The minimum ranks of sign patterns and spectrally arbitrary sign patterns, University of Electronic Science and Technology, Chengdu, September 2008

Sign solvability and stability, University of Electronic Science and Technology, Chengdu, September 2008

Sign nonsingular sign patterns, University of Electronic Science and Technology, Chengdu, September 2008

Boolean matrix factorizations, Harbin Engineering University, Harbin, August 2008

Boolean matrix factorizations, Hong Kong University of Science and Technology, August 2008

Sign patterns that require all distinct eigenvalues, Lanzhou University, Lanzhou, June 2008

Sign patterns that require almost unique rank, Lanzhou University, Lanzhou, June 2008

Sign patterns and digraphs—a survey, Lanzhou University, Lanzhou, June 2008

Spectrally and inertially arbitrary sign pattern matrices, Tongji University, Shanghai, July 2007

Rational solutions of certain matrix equations, Tongji University, Shanghai, July 2007

Rational solutions of certain matrix equations, Lanzhou University, Lanzhou, July 2007

Recent results on rational realization of the minimum rank of a sign pattern matrix, North University of China, Taiyuan, July 2006

Recent results on rational realization of the minimum rank of a sign pattern matrix, Wuhan Polytechnic University, Wuhan, June 2006

Recent results on rational realization of the minimum rank of a sign pattern matrix,, Tongji University, Shanghai, June 2006

Rational realizations of the minimum ranks of sign pattern matrices, Lanzhou University, Lanzhou, July 2005

Minimum ranks of sign pattern matrices, Tongji University, Shanghai, August 2004

Some problems on sign pattern matrices, Tongji University, Shanghai, August 2002

On almost regular tournament matrices, Beijing Normal University, Beijing, August 2000.

The spectral radii of tournament matrices, Georgia State University, Atlanta, September 1998

Sign pattern matrices that allow nilpotence, Georgia State University, Atlanta, February 1998

The structure of nonnegative cyclic matrices, North Carolina State University, Raleigh, December 1993

Sign patterns that allow diagonalization, Georgia State University, Atlanta, October 1992.

The embedding of rings in regular rings and π -regular rings, Georgia State University, Atlanta, February 1991

Some innovative applications of the mean value theorem, Mars Hill College, Mars Hill, April 1990

Rings embeddable in regular rings and π -regular rings, North Carolina State University, Raleigh, March 1990

Rings embeddable in regular rings and π -regular rings, Southwestern Louisiana University, Lafayette, January 1990

A determinantal inequality for GCD-matrices, North Carolina State University, Raleigh,

September 1988

Professional Service

Member of the Scientific Committee of the 2021 China-Korea-USA Int'l Conference on Matrix Theory with Applications.

Guest Editor of the special issue of Mathematics for papers presented at the 2021 China-Korea-USA Int'l Conference on Matrix Theory with Applications.

Chair of the Organizing Committee of the Workshop on Matrix Theory and Its Applications, Georgia State University, originally planned for August 2020, postponed due to Covid-19.

Co-organizer of the Combinatorial Matrix Theory Special Session at the 2019 Regional American Math Society Meeting, Auburn University, March 15 – 17, 2019

Grant proposal reviewer for National Science and Engineering Research Council of Canada, 2008 – 2009, 2015 – 2016, 2018 – 2019, 2021-2022

Member of the Scientific Committee of the 2019 International Conference on Matrix Equations and Matrix Inequalities, Guilin, China, June 7 – 10, 2019

Member of Scientific Committee for the International Research Center for Tensor and Matrix Theory, Shanghai University, 2016 – Present

Reviewer of a Cambridge University Press book proposal, 2018.

Reviewer of a Springer book project “Some topics on generalized inverses”, 2017.

Member of the Editorial Boards of Algebra (2012 – 2016), JP Journal of Algebra, Number Theory and Applications (2001 – Present)

Reviewed recently published papers for Mathematical Reviews, 2001 – present

Refereed numerous papers for mathematical journals (1990 – present) such as Linear Algebra and Its Applications, Linear and Multilinear Algebra, Discrete Mathematics, Electronic Journal of Linear Algebra, Czech Math Journal, Special Matrices, Annals of Functional Analysis, Rocky Mountain Mathematics Journal, SIAM Journal on Matrix Analysis and Applications, JP Journal of Algebra, Number Theory and Applications, Korean Journal of Mathematics, Journal of Systems Science and Complexity, Operators and Matrices, Advances in Mathematics, Advances in Applied Mathematics, and The Fibonacci Quarterly

Session Chair of the 2015 Shanghai International Workshop on Matrix Equations and Inequalities, Shanghai, June 2015

Session Chair of the 5th International conference on Matrix Analysis and Applications, Fort

Lauderdale, Dec. 2015.

Co-organizer of the Minisymposium on Sign Pattern Matrices in the 2014 International Linear Algebra Society Conference in Seoul, August 2014

Co-Chair of the Organizing Committee of the 2013 International Workshop on Graphs and Matrices, North University of China, Taiyuan, July 10 – 13, 2013

Co-organizer of the Minisymposium on Sign Pattern Matrices in the 2013 International Linear Algebra Society Conference in Providence, RI, June 2013

Reviewed the manuscript of “A Second Course in Linear Algebra” by Stephen R. Garcia and Roger A. Horn, Cambridge University Press, 2016.

Reviewed the manuscript of the 3rd edition of “Real Analysis and Foundations” by Steven Krantz, Chapman & Hall/CRC, 2013

Reviewed the manuscript of the 2nd edition of “Matrix Analysis” by R.A. Horn and C.R. Johnson, Cambridge University Press, 2012

Reviewed the manuscript of “Matrix Theory: Basic Results and Techniques” by Fuzhen Zhang, Springer 1999

Invited contributor to Handbook of Linear Algebra, Chapman& Hall/CRC, 2007 and to the 2nd edition of Handbook of Linear Algebra, Chapman& Hall/CRC, 2013

Chaired a session of the 10th International Conference on Matrix theory and Its Applications, Guiyang, July 2012

Chaired a session of the 2012 Workshop on Matrices and Operators, Harbin, July 2012

Chaired a session of Atlanta Lecture Series on Graph Theory, GSU, 2011

Chaired a session of the 14th ILAS Conference, Shanghai, July 2007

Co-organizer of the Matrix Theory Symposium in Honor of Jean Bevis, GSU, May 2005

Chaired a session of the 12th ILAS Conference, Regina, June 2005

Member of the Scientific Committee and Chair of a plenary session of the Fifth China Matrix Theory International Conference, Shanghai, August 2002

Chaired a session of the Tenth ILAS conference, Auburn, June 2002

Co-organizer of three matrix theory and linear algebra special sessions at the 2002 American Mathematical Society Southeastern Regional Conference, Atlanta, March 2002

Co-organizer of a Special Session on Combinatorial Matrix Theory, the Fourth China Matrix Theory International Conference, Kunming, August 2000

Co-organizer and chair of a Special Session on Combinatorial Matrix Theory, the Third Chinese Matrix Theory International Conference, Zhangjiajie, China, August 1998

Co-organizer of four Matrix Theory Sessions at the 1996 American Mathematical Society Southeastern Regional Conference, Chattanooga, October 1996

Chaired the Special Session on Sign Pattern Matrices of the 1996 American Mathematical Society Southeastern Regional Conference, Chattanooga, October 1996

Chaired a session of the Fifth Conference of the International Linear Algebra Society, Atlanta, August 1995

Served on the Local Arrangement Committee for the Fifth Conference of the International Linear Algebra Society, Atlanta, August 1995

Membership in Professional Societies

American Mathematical Society, 1987 – present

International Linear Algebra Society, 1992 – present

Chinese Linear Algebra Society, 1998 – present

Teaching Activities

1. PhD and MS Students Directed

PhD Students Directed

Guangming Jing (Dissertation Defense on May 24, 2019; graduated in Summer 2019)

Chris Zagrodny, (Dissertation Defense on Nov. 30, 2018; graduated in Fall 2018)

Wei Gao (Dissertation Defense on May 6, 2016; graduated in Summer 2016)

Fei Gong (visiting PhD student, 2011-2013; obtained PhD from Tongji University in June 2013)

Hanfei Xu, joined the PhD program in 2019

Zheng Yang, joined the PhD program in 2019

Jiamin Pan, joined the PhD program in 2022

MS Theses Students Directed

Caroline Parness, Sign patterns that allow J-orthogonality,
Date of thesis defense: Nov. 17, 2017.

Paul Kim, 4 by 4 irreducible sign patterns that require four distinct eigenvalues,
Date of thesis defense: July 7, 2012.

Assefa Merid, Sign Patterns That Require Almost Unique Rank
Date of Thesis Defense: April 11, 2008.

Krishna Kaphle, Spectrally Arbitrary Tree Sign Patterns.
Date of Thesis Defense: Oct. 18, 2006.

Selcuk Koyuncu, Rational Realization of Minimum Ranks of Sign Patterns,
Date of Thesis Defense: Oct. 7, 2005.

Emmanuel des-Bordes, Minimum Ranks of Sign Pattern Matrices,
Date of Thesis Defense: March 19, 2004.

Di Wang, On the Inertia of Symmetric Matrices with a Given Graph
Date of Thesis Defense: July 23, 1998.

Deborah Harrell, the Inverse-Transpose Property.
Date of Thesis Defense: February 8, 1996.

MS Nonthesis Research Papers Directed

Abeer Zeineddine, Minimum ranks of sign pattern matrices, Spring, 2019.

Liping Yin, The symplectic representation for the infinite type surfaces, Spring 2018.

Laura Harris, Sign patterns that require all distinct eigenvalues, 1998-1999.

Sai Kumar Reddy, Some new applications of Householder transformations, Spring 1997

Fang Lin, On the smallest degree of the minimal polynomials of matrices with specified sign pattern, Summer 1997.

Minal Vaidya, The Jordan canonical form: some applications, properties and computations, Fall 1997.

2. Undergraduate Research Papers Directed

Adam Nguyen, Multi-jumping optimization, Spring 2021

Elias Meana, Real polynomials positive in the positive orthant, RIMMES, 2020-2021

Ruting Wang, Sign patterns, geometry, and graph theory, 2017

Ying Cheng and Haibo Liu, Sign patterns that allow diagonalizability, 2017

Bojuan Yi, Polar and Singular Value Decompositions, 2017.

Victor Bailey, Some 4 by 4 sign patterns that require all distinct eigenvalues, RIMMES, 2012 – 2013.

Kevin Slote, The Riemann hypothesis and the Redheffer matrices, RIMMES, 2012 – 2013

William J. Scruggs, Some applications of linear algebra, Fall 2006.

3. Graduate Research Assistants Directed

Held regular meetings with the students to direct their research. Trained the students how to use mathematical software such as Matlab and Maple to solve certain problems in combinatorial matrix theory. Taught the students LaTeX to typeset mathematical papers professionally.

Jiamin Pan, Spring 2022 – present

Hanfei Xu, Fall 2019 – present

Zheng Yang, Fall 2019 – present

Chris Zagrodny, Spring 2016 – Fall 2018

Caroline Parness, Summer 2016 – Spring 2018

Guangming Jing, Fall 2013 – Summer 2019

Wei Gao, Fall 2011 – Summer 2016

Paul Kim, Spring 2011 – Summer 2011

Assefa Merit, Fall 2007 – Spring 2008

Krishna Kaphle, Spring 2006 – Fall 2006

Konyuncu Selcuk, Fall 2004 – Summer 2005

Emmanuel des-Bordes, Summer 2003 – Spring 2004.

Di Wang, Fall 1997 -Winter 1998.

Deborah Harrell, Fall 1994 - Winter 1996.

Shelly Dotson, Fall 1996 - Spring 1997.

4. Membership on MS Thesis or PhD Dissertation Committees

Alan Dills, PhD, 2020–2021

Xuli Qi, PhD, 2020–2021

Fredric Dahlgren, PhD, 2021 – 2022

Yuan Si, MS, 2021

Moosavi Motlaghian, PhD, 2019–2020

Yan Cao, PhD, 2019–2020

Irina Iliaeva, PhD, 2019–2020

Robin Baidya, PhD, Fall 2017 – Spring 2018

Siang Ng, PhD, Fall 2017 – Spring 2018

Amy Yates, PhD, Spring 2014 – Summer 2016

Mikhail Stroeve, PhD, Spring 2014 – Spring 2016

Hui Liu, PhD, Spring 2014 – Spring 2015

Songling Shan, PhD, Spring 2014 – Spring 2015

Adil Virani, MS, Spring 2014 – Spring 2015

Shan Luo, PhD, Spring 2012 – Spring 2013

Panakkal Mathew, PhD, Fall 2009 – Fall 2010

Keith Dobson, MS, Spring 2009 – Fall 2009

Jhansi Vasireddy, MS, Fall 2008 – Spring 2009

Erica Michele Day, MS, Fall 2007 – Fall 2008

Ken Kun Zhao, MS, Fall 2007 – Fall 2008

John Thomas Frederic, MS, Fall 2007 – Fall 2008

Wasuta Renkjunong, MS, Fall 2005 – Summer 2007

Crystal M. Gordon, MS, Fall 2006 – Spring 2007

Tsegellassie Workalemahu, MS, Fall 2006 – Spring 2008

Nathalie Nicholle Smalls, MS, Fall 2006 – Fall 2007

Nilay Demir, MS, Spring 2006 – Spring 2007

Kinnari Patel, MS, Spring 2004 – Spring 2005. A joint paper based on the thesis was published in a prestigious journal.

5. Membership on M.Sc. Comprehensive Examination Committees

Kun Wang, 2011
Jin Fan, 2005
Kinnari Patel, 2004
Lindsey Mann, Fall 2002, Chair
Chris Smith, Fall 2000.
Laura Harris, Summer 1998, Chair.
Amber Kirby, Summer 1998.
Evgenia Rubinshtein, Summer 1998
Frederick Brendel, Spring 1997, Chair.
P. Sai Kumar Reddy, Spring 1997, Chair.
Vilia Kirvelaitis, Summer 1997.
Minal Vaidya, Fall 1997, Chair.
Deborah Harrell, Spring 1996, Chair.
Sumarie Bass, Fall 1995.
Karen Phillips, Winter 1995.
Hong Yin, Summer 1994.
Yunhong Xie, Summer 1994.

6. Course and Program Development

Chair of the Applied Math Concentration Proposal Subcommittee (Spring 2021- Spring 2022). The committee drafted two proposals to create the Applied Math concentrations in the PhD and MS programs in the Department of Math/Stat. The proposals were approved by the department faculty and was submitted to the College for consideration.

Chairman of Mathematics Graduate Committee (March 2010 – Summer 2015, August 2019 – present). In charge of approving graduate course proposals, approving proposed changes in the graduate program, Graduate Program assessment, schedule of graduate course offerings.

Proposed non-thesis options for four concentrations in the MS program, Fall 2011.

Co-proposer of Math 8535, Applied Matrix Algebra. This matrix theory course was designed for statistics, bioinformatics, and other non-pure math majors, Fall 2012-Spring 2013. This course was offered for the first time in Spring 2014. Developed course materials while teaching this course in Spring 2017 and Spring 2019.

Chairman of Mathematics Undergraduate Committee (Jan. 2006 – 2009), member 2009 – present. Involved in approving undergraduate and dual level mathematics course proposals, Undergraduate Mathematics Learning Outcomes Assessment, and the Pattern of Course Offerings of upper level mathematics courses.

Coordinator for Math 2212 (Fall 2004 – Spring 2006). Led discussions involving this course and the efforts in uniform coverage and uniform assessment in this course.

Co-Chair of Mathematics and Statistics Ph.D. Proposal Committee (2004 – 2006).

Developed Ph.D. Proposal and Pre-proposal for Ph.D. in Mathematics and Statistics, with concentrations in Bioinformatics, Collegiate Mathematics Education, and Biostatistics.

Co-proposed the new course, Math 8210, Topics in Applied Matrix Analysis, 2007–2008.

Co-proposed the new course Math 4381/6381, General Topology, 2006 – 2007.

Co-proposed a new course on Combinatorial Matrix Theory, Math 8201, 2006 – 2007.

Developed the curriculum for Ph.D. with concentration in Collegiate Mathematics Education, Fall 2004 – Fall 2005.

Developed the curriculum for Ph.D. with concentration in Bioinformatics, Spring 2005 – Fall 2005.

Co-proposed a new course, Error Correcting Codes (Math 4455/6455). This course was approved by the Mathematics Committee, the department faculty, and the college in 2002.

Co-proposed a new course, Cryptography (Math 4460/6460). This course was approved by the Mathematics Committee, the department faculty, and the college in 2002.

Involved in discussions about curriculum matters as a member of the Mathematics Graduate Committee and a member of the Mathematics Committee.

Served on the Math 3000 Textbook Committee, 2002.

Incorporated technology such as Maple and Matlab in Math 2211, Math 2212, Math 2215, Math 3435, Math 4435 and Math 8200.

Redesigned Math 8200 and selected a new textbook for Math 8200 (Advanced Matrix Analysis), 1998.

Participated in an ATLAST (Augmenting Teaching of Linear Algebra through the use of Software Tools) workshop in 1994 and experimented with using Matlab in teaching Math 335 (Introductory Linear Algebra). Served on the Math 335/435 textbook committee, 1995.

Served on the Textbook Committee for Math 220 (Discrete Mathematics), 1993.

Involved in a funded NSF grant proposal lead by Professor Dubinsky, to implement the recommendations made by the NSF sponsored Linear Algebra Curriculum Study Group, 1998.

7. Courses Taught at GSU

Pre-calculus, College Algebra, Elementary Statistics, Survey of Calculus, Geometry and Spatial Sense, Linear Algebra I, Linear Algebra II, Calculus of One Variable I, Calculus of

One Variable II, Multivariate Calculus, Discrete Mathematics, Bridge to Higher Mathematics, Theory of Numbers, Analysis I, Analysis II, Senior Seminar, Advanced Matrix Analysis, Modern Algebra I, Modern Algebra II, Advanced Abstract Algebra, Topics in Applied Matrix Analysis, Applied Matrix Algebra, Combinatorial Matrix Theory

8. Courses Taught Elsewhere

At North Carolina State University: Ordinary Differential Equations, Calculus of One and Several Variables I and II, College Algebra and Trigonometry.

At Hebei Normal College: Modern Algebra.

At Beijing Normal University: Linear Algebra, Modern Algebra, Advanced Modern Algebra.

9. Supervision of Visiting Scholars

Prof. Jin Zhong of Jiangxi University of Science and Technology, Fall 2019 – Fall 2020

Prof. Yueliang Liang of North University of China, Fall 2019 – Fall 2020

Prof. Xiaoxin Xu of North University of China, Fall 2019 – Fall 2020

Prof. Jiang Zhou of Harbin Engineering University, Visiting Scholar, Fall 2018 – Fall 2019

Prof. Xinlei Feng of Leshan Normal University, Visiting Scholar, Fall 2016 – Fall 2018

Prof. Xiaofeng Chen of Chongqing Jiaotong University, Visiting Scholar, Spring 2016 – Spring 2017

Prof. Mingyu Shi of Hebei University, Visiting Scholar, Fall 2015 – Spring 2016

Prof. Fuping Tan of Shanghai University, Visiting Scholar, Spring 2013 – Spring 2014

Dr. Lihua Zhang of Shanghai Jiaotong University, Postdoctoral Fellow, Fall 2010 – 2015

Fei Gong, Visiting PhD Student from Tongji University, Spring 2011 – December 2012

Prof. Yubin Gao of the North University of China, Visiting Scholar, Spring 2005

Service at GSU

College of Arts and Sciences Natural and Computational Sciences Promotion and Tenure Area Committee, 2009 – present, Chair (2017 – 2018), Co-Chair (2021-2022).

College of Arts and Sciences Graduate Council, 2010 – 2015, 2019 – present

College of Arts and Sciences Graduate Funding Working Group, Fall 2019

College of Arts and Sciences Lecturer Review Committee, 2010

Honors College Curriculum Committee, 2013 – 2015

Honors College Awards Committee, 2013 – 2015

Honors College Research Sponsors Committee, 2013 – 2015

GSU Internal Grant Review Committee, 2005 – 2007

University Senate, 2001 – 2007

GSU Senate Committees (2001 – 2007):

Budget Committee

Information Systems and Technology Committee

Student Technology Fee Committee

Commencement Committee

Library Advisory Committee

Academic Programs and Continuing Education Committee

Departmental Service

Graduate Director of Mathematics, Spring 2010 – Summer 2015, Fall 2019 – present

Dept Chair Search Committee, Spring 2021

Applied Mathematics Concentration Proposal Subcommittee, Spring 2021 – Spring 2022

Academic Program Review Committee, Spring 2021 – Spring 2022

Mathematics Graduate Committee, 2004 – present, (Chair, 2010 – 2015, 2019 – present)

Mathematics Undergraduate Subcommittee, (Chair, 2006 – 2010), 2006 – present

Collaborated extensively with Professors M. Arav, F. Hall, H. van de Holst, C. Eschenbach, M. Stewart, and G. Chen (colleagues at GSU) on many research projects.

Ran weekly Algebra and Discrete Mathematics Seminar at GSU, Fall 2009 – Spring 2010
Co-organized the Combinatorial Matrix Theory Seminars at GSU, 2016 – present.

Had numerous fruitful discussions concerning teaching and/or research with many colleagues including Drs. Arav, Bondarenko, Chen, Enescu, Grinshpon, Hall, Miller, Montiel, Qin, Shilnikov, Smirnova, Stewart, van der Holst, Vidakovic, Yao, Zhao, and Zhong.

Participated in the Discrete Math and Matrix Theory Seminars, 1991 – present

Served on additional departmental committees:

Departmental Hiring Plan Committee, Fall 2018 – Spring 2019.

Colloquium Committee, 1993 – 1999, 2016 – present

Honors Program and Honors at Graduation Committee, 2013 – 2016

Visiting Assistant Professor Search Committee, 2014 – 2015

Departmental Chair Evaluation Committee, 2014 – 2015

Statistics Search Committee, 2013 – 2014

Academic Program Review Committee, 2013 – 2014

Analysis Search Committee, 2012 – 2013.

Department Chair Evaluation Committee, 2011 – 2012

Promotion and Tenure Committee, 1998 – present

Lecturer Review and Promotion Guidelines Revision Committee, Chair, 2009 - 2011

Visiting Lecturer/Visiting Instructor Search Committee, Chair, 2009

Bioinformatics Search Committee, Chair, 2007 – 2008

Co-Chair of Mathematics and Statistics Ph.D. Proposal Committee, 2004 – 2006.

Research Committee, 2004 – 2008, Co-Chair, 2004 – 2006

Ad hoc Department Bylaws Committee, 2007–2008

Contract Renewal Advisory Committee, Chair, 1999 – 2004

Improvement of Instruction Committee, 2004

Mathematics Search Committee, 2004-2005

Mathematics Education Search Committee, 2004–2005, 2006–2007

Dept Chair Search Committee, Fall 2003

Dept Chair Evaluation Committee, Spring 2003

Mathematics Committee, 1999 – 2002

Graduate Program Committee, 1999 – 2004

Library Committee, 1993 – 2004

Graduate Faculty, 1993 – present

Departmental Promotion and Tenure Manual Committee, 1998

Executive Committee, 1997

Mathematics Search Committee, 1998 – 1999.

Honors Committee, 1993 – 1999

Math 3000 Textbook Committee, 2002

Math 220 Textbook Committee, 1993

Math 335/435 Textbook Committee, 1995; 1999

Ad hoc Grade Appeals Committee, 1995

System Programmer II Search Committee, 1997

Honors

Named as a Shanxi Province 100 Talent Program Eminent Scholar, 2011.

Being invited to give invited talks at over 40 international conferences

Support from NSF of China and Tongji University for academic visits, 2004 – 2012.

Support from NSF of China and Harbin Engineering University for academic visits, 2008 – 2015.

Support from North University of China for academic visits, 2006 – present.

Appointed as Honorary Guest Professor of North University of China, 2006 – present

Included in American Men and Women of Science.

Certificate of Excellence from Lanzhou University, 1983.

Won first prize in the 1979 Gansu Province Mathematics Competition and entered the 1979 National Mathematics Competition in China.

Received numerous awards for excellent academic achievements from the high schools attended and from the county and municipal education departments.