Farhad Shahrokhi (Short Vita)

Department of Computer Science and Engineering
University of North Texas
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Education

1. 1988 Ph.D. in Mathematics with concentration on graph algorithms, Western Michigan University.Thesis: The Maximum Concurrent Flow Problem. Thesis Advisor, D.W. Matula.

2. 1985-87 Post Doc. Department of Computer Science, Southern Methodist University, hosted by D. W. Matula.

3. 1983 M.S. in Computer Science, Western Michigan University.

4. 1981 M.S. in Operations Research, Western Michigan University

5. 1976 B.S. in Electrical Engineering, Sharif (Aryamehr) University of Technology, Tehran, Iran.

Employment History

1. 2000- Professor (with tenure), Department of Computer Science, University of North Texas.

2. 1994-2000 Associate Professor (with tenure), Department of Computer Science, University of North Texas.

3. 1989-94 Assistant Professor, Department of Computer Science, University of North Texas.

4. 1988-89 Assistant Professor, Department of Computer Science, New Mexico Tech.

Research Positions(8 weeks or more)

1. 1998-1999 Visiting Scientist, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Rutgers University.

2. 1988 Visiting Scientist, Institute for Mathematics and its application, (IMA) University of Minnesota, 1988.

Research Interests: Design and Analysis of Algorithms, Combinatorial Optimization, Graph Theory:Google Scholar reports 79 publications, 1367 citations and an h-index of 18.

Publications in Journals

1. Farhad Shahrokhi, Largest reduced neighborhood clique cover problem revisited, Congressus Numerantium, 2017.

2. Farhad Shahrokhi, On the largest reduced neighborhood clique cover number of a graph, Congressus Numerantium, 226 (2016), 273-279.

3. Farhad Shahrokhi, Bounds for the Clique Cover Width of Factors of the Apex Graph of the Planar Grid, Congressus Numerantium, 224 (2015), 213-220.

4. Farhad Shahrokhi, Algorithms For Longest Chains In Pseudo- Transitive Graphs, Congressus Numerantium, 221 (2014), 21-30.

5. Farhad Shahrokhi, Clique cover width and clique sum, Congressus Numerantium, 218 (2013), 135-140.

6. Farhad Shahrokhi, Unit Incomparability Dimension and Clique Cover Width in Graphs, Congressus Numerantium, 213 (2012), 91-98.

7. Farhad Shahrokhi, On the clique cover width problem, Congressus Numerantium, 205 (2010), 97-103.

8. Farhad Shahrokhi, A New upper bound for the clique cover number with applications, Congressus Numerantium, 205 (2010), 105-111.

9. Farhad Shahrokhi, Guest Editor's Foreword:Algorithms, Combinatorics, and Geometry, Algorithmica, 60:3, (2011), 481-483.

10. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Bounds and methods for K-planar Crossing Numbers, Invited Paper, Disc. Applied Mathematics. 155(9), 2007,1106-1115.

11. Guest Editor's Foreword: Pach, J., Shahrokhi F. , Special Issue of Algorithmica on Graph Drawing, 47(4), 2007, 365.

12. Guest Editor's Foreword, Shahrokhi, F., Székely, L., Disc. Comp. Geometry and Graph Drawing(, Discrete and Computational Geometry, 28(4), 2002, 447.

13. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., On bipartite drawings and linear arrangement problem. SIAM Journal on Computing, 30(6), 2001, 1773-1789.

14. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., A New Lower Bound for Bipartite Crossing Number with Algorithmic Applications, Theoretical Computer Science, 245(2), 2000, 281-294.

15. Shahrokhi, F., Székely, L.A., Constructing integral uniform flows in networks with applications to the edge-forwarding index problem. Discrete Applied Math. 108, 2001, 175-191.

16. Shahrokhi, F., Shi, W., On Crossing Sets, Disjoint Sets and Pagenumber, Journal of Algorithms, 34(1), 2000, 40-53.

17. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Intersection of Curves and Crossing Number of $C_n \times C_m$ on a Surface, Disc. Comp. Geometry, 19, 1998, 237-247.

18. Shahrokhi, F. and Székely, L.A., Integral Multicommodity Flows in Product Graphs, Congressus Numerantium, 122, 1996, 67-89.

19. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., The Book Crossing Number of Graphs, Journal of Graph Theory, 21(4), 1996, 413-424.

20. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Bounds for the Crossing Number of a Graph on a Compact Two Manifold, Advances in Mathematics, 123(2), 1996, 105-119.

21. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Drawing of Graphs With a Few Crossings on the Surfaces, Special Issue of Algorithmica on Graph Drawing, 16, 1996, 118-131.

22. Pach, J., Shahrokhi, F. and Szegedy, M., Applications of Crossing Number, Special Issue of Algorithmica on Graph Drawing, 16, 1996, 111-117.

23. Shahrokhi, F. and Székely, L.A., On Canonical Concurrent Flows, Crossing Number, and Graph Expansion, Combinatorics, Probability and Computing 3, 1994, 1-21.

24. Shahrokhi, F., and Székely. L.A., On the Complexity of Bottleneck Bipartite Problem, Journal of Combinatorial Mathematics and Combinatorial Computing, 15, 1994, 221-226.

25. Shahrokhi, F. and Székely, L.A., Integral Multicommodity Flow and Packet Routing, Congressus Numerantium, 97, 1993, 2-16.

26. Clark, L., Shahrokhi, F. and Székely, L.A., A Linear Time Algorithm for Graph Partition Problems, Information Processing Letters, 42, 1992,19-24.

27. Shahrokhi, F. and Matula, D. W., The Maximum Concurrent Flow Problem, Journal of Association for Computing Machinery, 37, 1990, 318-334.

28. Matula, D. W. and Shahrokhi, F., Sparsest Cuts and Bottlenecks in Graphs, Journal of Disc. Applied Math., 27, 1990, 113-123.

29. Shahrokhi, F., Approximation Algorithms for the Maximum Concurrent Flow Problem, ORSA Journal on Computing, 1(2), 1989, 62-69.

30. Lindhorst, G. and Shahrokhi, F., On Renaming a Set of Clauses as a Horn Set, Information Processing Letters, 30, 1989, 298-303.

Publications in Conferences

31. Farhad Shahrokhi, New representation results for planar graphs, , 29th European Workshop on Computational Geometry, March 17-20 2013, (4 pages).

32. Farhad Shahrokhi, New separation theorems and sub-exponential time algorithms for packing and piercing of fat objects, the proceedings the 28th European Workshop on Computational Geometry ,2012 - Assisi, Perugia, Italy, 269-273.

33. Farhad Shahrokhi, A new separation theorem with geometric applications, Proceedings of 26th European Workshop on Computational Geometry, EuroCG2010, 2010, 253-256.

34. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., On Convex Crossing Numbers, Proceedings of COCOON 2003, LNCS 2697, 487-549.

35. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Bounds and methods for K-planar Crossing Numbers, Proceedings of GD2003, LNCS 2004, 37-46.

36. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., The Gap between Convex Crossing Numbers and the Crossing Numbers, (Invited Paper) In Proceedings of DIMACS Workshop on Geometric Graph Theory (2002), Towards a theory of Geometric Graphs, Ed. J. Pach, *Contemporary Mathematics*, American. Math. Soc., 2003, 167-176.

37. Shahrokhi, F., Vrto, I., On 3-layer drawings and pseudo-arrangements, in Proc. of Graph Drawing 99, (GD99), LNCS, Springer Verlag, 1999, 225-231.

38. Shahrokhi, F. and Székely, L.A., Integral uniform flows in symmetric networks, Proc. of International Workshop on Graph-Theoretic Concepts in Computer Science, WG1998, LNCS, Springer Verlag, 1998, 272-284.

39. Shahrokhi, F., Székely, L.A., Vrťo, I., Bipartite crossing numbers of meshes and cubes, Proc. of Graph Drawing 97, (GD97), LNCS 1353, Springer Verlag, 1997, 37-46.

40. Shahrokhi, F., Sýkora, O., Székely, L. A., Vrťo, I., On bipartite crossings, biplanar subgraphs, and the linear arrangement problem, in Proc. 5th Workshop Algorithms and Data Structures, (WADS'97), LNCS 1272, Springer-Verlag, 1997, 55-68.

41. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Crossing Number Problems: Bounds and Applications, invited paper, in Intuitive Geometry eds. I. Bárány and K. Böröczky, Bolyai Society Mathematical Studies 6, 1997, 179-206.

42. Shahrokhi, F., Shi, W., Efficient Algorithms for Embedding Graphs on Books, Proceedings of COCOON 96, LNCS Springer-Verlag, 1996, 162-168.

43. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Crossing Number of Meshes, in Proceedings of Graph drawing 95 (GD95), LNCS 1027, Springer-Verlag, 1996, 197-209.

44. Shahrokhi, F. and Székely, L.A., On Group Invariant Flows and Applications, Graph Theory, Combinatorics, and Applications Proceedings of the 7th International Conference on Theory and Applications of Graphs, *Wiley and Sons*, 1995, 1033-1042.

45. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Book embedding and Crossing Numbers, in Proceedings of 20th International Workshop on Graph-Theoretic Concepts in Computer Science, LNCS 903, Springer-Verlag, 1995, 112-122.

46. Shahrokhi, F., Székely L.A., and Vrťo, I., Crossing Numbers of Graphs, Lower Bound Techniques and Algorithms: A Survey, Proc. of Graph Drawing 94 (GD94), LNCS, 894, Spring Verlag, 1995, 131-142.

47. Shahrokhi, F., Sýkora, O., Székely, L.A., and Vrťo, I., Improved Bounds for Crossing Number of a Graph on a Compact 2-Manifold, Proceedings of 19th International Workshop on Graph-Theoretic Concepts in Computer Science, LNCS, 790, Springer-Verlag, 1993, 388-395.

48. Shahrokhi, F. and Székely, L.A., Packet Routing in Graphs, Proceedings of 19th International Workshop on Graph-Theoretic Concepts in Computer Science, LNCS 790, Springer-Verlag, 1993, 327-337.

49. Pach, J., Shahrokhi, F. and Szegedy, M., Applications of Crossing Number, Proceedings of Tenth Annual ACM Symposium on Computational Geometry, May 1994.

50. Shahrokhi, F. and Székely, L.A. A New Approach to the Uniform Multicommodity Flow Problem, 14th International Symposium on Mathematical Programming, Amsterdam, Aug. 1991. (acceptance rate was 20%.)

51. Shahrokhi, F. and Székely, L.A., Effective Lower Bounds for the Crossing Number, Bisection Width and Balanced Vertex Separators in Terms of Symmetry, Proceedings of the Second Conference in Integer Programming and Combinatorial Optimization, 1992, CMU Press, Pittsburgh, 102-114.

52. Shahrokhi, F., Duality Theorems for the Maximum Concurrent Flow Problem, Proceedings of the Sixth International Conference on Theory and Applications of Graphs, Wiley and Sons, 1991, 1075-1082.

53. Shahrokhi, F. and Matula, D. W., On Solving Large Maximum Concurrent Flow Problems, Proceedings of ACM 1987 National Conference, 205-209.

Technical Reports:

54. Shahrokhi, F., Shi, W. Polynomial time deterministic algorithms for pagenumber, crossing and disjoint sets. DIMACS Tech. Report TR:98-46, 1998.

55. Shahrokhi, F., Székely, L.A, Uniform Concurrent Multicommodity Flow in Product Graphs, Report 92744, Institut Für Ökonometrie Und Operations Research Rheinische Friedrich-Wilhelms-Universität, Bonn, 1992.

56. Shahrokhi, F., Székely, L.A, An Algebraic Approach to the Uniform Multicommodity Flow Problem: Theory and Applications, Report 92745, Institut Für Ökonometrie Und Operations Research Rheinische Friedrich-Wilhelms-Universität, Bonn, 1992.

Selected Invited Presentations

1. Farhad Shahrokhi, Crossing Number and Congestion of Tree Decomposition, Special Session on Crossing Numbers, the American Mathematical Society Regional Meeting (1107),Washington, DC, 2015.

2. Shahrokhi, F., On pseudo-partial orders, the Workshop on Combinatorial Geometry and Topology, Univ. of Texas at Brownsville, April 2008.

3. Shahrokhi, F., *On Pseudo-transitive Graphs*, Special Session on Graph Theory and Combinatorics, Joint AMS-SMM International Meeting in Houston, TX, May 13-15, 2004.

4. Shahrokhi, F., On Pseudo-transitive Graphs, DIMACS workshop on geometric graph theory, Center For Discrete Mathematics and Theoretical Computer Science, Rutgers University, NJ, 2002.

5. Shahrokhi, F. Algorithms and Covering Theorems For Pseudo Transitive Graphs, SIAM Conference in Disc. Mathematics, San Diego, CA, 2002.

6. Shahrokhi F., Algorithms and Covering Theorems For Pseudo-Transitive Graphs With Geometric Applications, the ELBE SANDSTONES GEOMETRY WORKSHOP July 2001, Charles University, Prague, Czech Republic.

7. Shahrokhi F., Algorithms and Covering Theorems for Pseudo-Transitive Graphs, PRAGUE MIDSUMMER COMBINATORIAL WORKSHOP, August, 2001, Charles University, Prague, Czech Republic.

Selected Presentations

8. Farhad Shahrokhi, k-domination in the intersection graph of geometric objects, to be presented, in 47th Southeastern International Conference on Combinatorics, Graph Theory and Computing, 2016.

9. Farhad Shahrokhi, New Results For Edge Covering of Hypergraphs, in, 46th Southeastern International Conference on Combinatorics, Graph Theory and Computing, 2015 (Abstract).

10. Farhad Shahrokhi, clique cover width and clique sum, presented in Forty-Fifth Southeastern International Conference on Combinatorics, Graph Theory and Computing, 2014 (Abstract).

11. New representation results for graphs with bounded clique cover width, presented in Forty-Forth Southeastern International Conference on Combinatorics, Graph Theory and Computing, 2013 (Abstract).

12. Farhad Shahrokhi, New separation results for planar graphs and graphs with an excluded minor, presented at Forty-Third Southeastern International Conference on Combinatorics, Graph Theory and Computing, 2012 (Abstract).

13. Shahrokhi, F., Generalized Bandwidth and Clique Cover Separation, In Forty-First Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL, 2010 (Abstract). ZZ

14. Shahrokhi, F., A new look at the tree decomposition, in Fortieth Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL, 2009 (Abstract).

15. Shahrokhi, F. Pseudo-transitive Graphs, Department of Computer Science, SMU, 2003 .

16. Shahrokhi, F. On Crossing Number Problems, Department of Mathematics, University of South Carolina, 1998.

17. Shahrokhi, F., *Crossing numbers: Bounds and Applications*, 1997 Workshop on Algorithmic Research in Midsouthwest (WARM'97), UNT, 1997.

18. Shahrokhi, F., Sýkora, O., Székely L.A., and Vrťo, I., On bipartite crossings, largest biplanar subgraphs, and the linear arrangement problem AMS Meeting at Oaxaca, Mexico, December 1997 (Abstract).

19. Shahrokhi, F., Székely, L.A., Uniform Concurrent Flow in Product Graphs (Abstract), 27th Southeast International Conference in Combinatorics, Graph Theory, and Computing, LSU 1996.

20. Shahrokhi, F., Sýkora, O., Székely L.A., and Vrťo, I., Bounds for the Crossing Number of a Graph on a Compact Two Manifold, AMS National Meeting, May 1993, (Abstract) p. 410.

21. Shahrokhi, F., Crossing Number of Symmetric Graphs on a Compact Two Manifold, 1992 Workshop on Algorithmic Research in Midsouthwest (WARM'92), SMU.

22. Shahrokhi, F. and Székely, L.A., New Lower Bounds for the Crossing Number, Seventh International Conference on Theory and Applications of Graphs, WMU, 1992.

23. Shahrokhi, F., An Algebraic Approach to Concurrent Flows, Department of Computer Science, Texas A&M University, 1991.

24. Shahrokhi, F., Lower Bounds for the Crossing Number, presented at at the Department of Computer Science, Southern Methodist University 1991.

25. Shahrokhi, F., On Concurrent Flows, Department Computer Science, Southern Methodist University, 1991.

26. Shahrokhi, F., Solving Large Multicommodity Flows, presented at BNR, 1990.

27. Shahrokhi, F. and Székely, L.A., A Combinatorial Approach to Integral Multicommodity Flow Problems, AMS National Meeting, March 1990. (Invited Talk; Co-author presented the talk.)

28. Shahrokhi, F. and Barefoot, C., 1-Hamiltonian Connectivity of 4-Connected Halin Graphs, International Southeast Conference on Combinatorics and Computing, Boca Raton, 1989.

29. Shahrokhi, F., On Solving the Universal Packet Routing Problems for Parallel and Distributed Systems 1989 New Mexico Computer Science Conference, Socorro, 1989.

30. Shahrokhi, F., Communications Complexity and Routing in Parallel Computing, 1988 New Mexico Computer Science Conference, Albuquerque, 1988.

31. Shahrokhi, F., The Maximum Concurrent Flow Problem, presented at the Department of Mathematics, Massachusetts Institute of Technology. 1987.

32. Matula, D.W., Shahrokhi, F., and Thompson, B., Another Look at Divisive Hierarchical Clustering Procedures, 20th Annual International Conference on Numerical Taxonomy (NT-20), 1986.

33. Shahrokhi, F., An Efficient Routing Algorithm to Solve the Maximum Concurrent Flow Problem with Applications to the Packet Switched Telecommunication Networks and Cluster Analysis, ACM 1986 National Conference.

34. Shahrokhi, F. and Matula, D.W., An Efficient Iterative Solution to the Maximum Concurrent Flow Problem, ORSA/TIMS 1985 Joint National Meeting, (Abstract) p. 136.

35. Matula, D.W., Helgason, R.V., Shahrokhi, F., Thompson, B.W., Applications in Cluster Analysis of Maximum Concurrent Network Flows, ORSA/TIMS 1985 Joint National Meeting, (Abstract) p. 136.

External Funding

1. **The National Science Foundation:** Workshop on Algorithms, Combinatorics and Geometry, Principal Investigator, CCR- 2007-2009, $9,000.

2. **The National Science Foundation:** Solving crossing number problems with applications, Principal Investigator, CCR-9988525, $175,280, 2000-2005.

3. **The National Science Foundation:** NSF/CBMS Regional Research Conference on Geometric Graph Theory, Principal Investigator, DMS-0121729, $29,969, 2001-2003.

4. **The National Science Foundation:** Crossing number problems in geometric drawings of graphs, Principal Investigator, CCR-9528228, $48,800, 1996-1999.

5. **DIMACS:** $6000, 1998-1999.

6. **MCI Dallas:** $15,000, 1995.

Professional Service

1. **Guest Editor:** Special Issue of Algorithmica on Algorithms, Combinatorics and Geometry, Springer, Algorithmica 60:3, July 2011.
2. **Member of Editorial Borad:** ISRN Discrete Mathematics: 2010-2013.
3. **Member of Reviewing Panel of Mathematical Reviews (MR) 2007-present**
4. **Organizer:** Workshop on Algorithms, Combinatorics and Geometry (ACG) UNT, Nov 29, Dec 1 2007.
5. **Guest Co-Editor:** Special Issue of Algorithmica devoted to Graph Drawing, 47(4) 2007 (co-editor was Janos Pach).
6. **Guest Co-Editor:** Special Issue of Discrete and Computational Geometry on Discrete and Computational Geometry and Graph Drawing, 28(4), 2002 (co-editor was Laszlo Szekely).
7. **Organizer:** Geometry Day, University of North Texas, OCT. 2004.
8. **Co-Chair of the Organizing Committee:** 12th International Symposium on Graph Drawing, 2004.
9. **Co-Organizer** Minisymposia on Discrete Geometry, SIAM Conference in Discrete Mathematics, June of 2004.
10. **Program Committee:** 11th International Symposium on Graph Drawing, 2003.
11. **Chair of Organizing Committee:** NSF/CBMS Regional Research Conference on Geometric Graph Theory, University of North Texas 2002.
12. **Co-organizer:** Special Session in Discrete and Computational Geometry, and Graph Drawing, AMS meeting at Columbia, South Carolina, March 2001
13. **Organizer:** 1997 Workshop on Algorithmic Research in Midsouthwest (WARM'97).
14. **NSF Panels:** 2002, 2003, 2005, and 2008.
15. **Reviewer:** Combinatorica, Euro. J. of Comb., IEEE TMC, Math. Prog., SIAM Journal on Disc. Math., FSTTCS2011, 28th Symposium on Computational Geometry, Ars Combinatoria, Networks, Euro. J. of Oper. Res., J. Comb. Theory, J. of Combinatorial Opt. SIAM J. on Disc. Mathematics, SODA2000, STOC2000, SODA94, Algorithmica, Disc. and Comp. Geom., Journal of Operations Research, Journal of Graph Theory, Networks, SIAM Journal on Computing, Journal of Algorithms, ORSA Journal on Computing, INFOR, Pattern Recognition, Networks, Seventh International Conference on Theory and Application of Graphs, IEEE Trans. on Computers

    Outside Reviewer: Evaluated a new program in CS at the University of Wisconsin (Superior), 1999.

Selected Service to the University of North Texas

Since 1989, Professor Shahrokhi has served in a variety of committees at the department , college and university levels. At the department level he has served in the curriculum, executive,

and search committees; He has served as the chair (or co-chair) of the departmental personnel affairs committee (PAC), twice, and chair of the search committee once. At the college level, he served in the committee that drafted the constitution of the college of engineering, served as a member of college of engineering PAC and, very recently chaired this committee for two consecutive terms. At the university level, he has served as a member of faculty senate, university review, university tenure and promotion and faculty grievance committees, and most recently, as a member of the policy review committee.

Awards and Acknowledgements

1. Nominee For Steven Piper Teaching Award, UNT, 2015.
2. Distinguished Service to the Faculty Senate at the University of North Texas, 2011 and 2014.
3. UNT Honor Professor Award 2008.
4. Nominee (jointly with D. W. Matula) for D. Ray Fulkerson Prize in discrete mathematics 1994: Paper, The Maximum Concurrent Flow Problem.