



## Davod Khojasteh Salkuyeh

Associate professor

### Personal

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- Date and place of birth: 1970, Salkuyeh, Langarud, Guilan

### Education

- **Ferdowsi university of Mashhad, Mashhad, Iran**  
*Ph.D in Applied Mathematics* 2004
  - Supervisor: Prof. Faezeh Toutounian
  - Thesis: Some developments on the iterative methods for solving large sparse linear system of equations
- **Ferdowsi university of Mashhad, Mashhad, Iran**  
*M.Sc in Applied Mathematics* 1997
  - Supervisor: Prof. Asghar Kerayechian
  - Dissertation: Solving the Stokes problem by the finite element method
- **Sharif university of technology, Tehran, Iran**  
*B.Sc in Applied Mathematics* 1994

## Research interests

- Iterative methods for large sparse linear system of equations and preconditioning techniques.
- Solving differential equations by the finite difference and finite element methods.
- Error analysis.

## Honors and executive profile:

1. Head of the department of mathematics of University of Mohaghegh Ardabili for two years.
2. Outstanding researcher of the Faculty of Basic Sciences, University of Mohaghegh Ardabili, 2006.
3. Outstanding researcher of the Faculty of Basic Sciences, University of Mohaghegh Ardabili, 2008.
4. Ranked number one among the MSc graduate students, Ferdowsi University of Mashhad, 1997.
5. Outstanding researcher in Basic Sciences of the Ardabil province, 2010.
6. Member of scientific committee of the fourth national mathematics conference, Payameh Noor, September 25 and 26, Ardabil.
7. Invited speaker at the 42nd Annual Iranian Mathematics Conference at Vali-e-Asr University of Rafsanjan, Iran.

## Referee for international journals

1. Journal of Computational and Applied Mathematics
2. Computers Mathematics with Applications
3. International Journal of Computer Mathematics
4. Journal of Applied Mathematics and Computing
5. Applied Mathematics and Computation
6. Applications and Applied Mathematics
7. Journal of Advanced Research in Applied Mathematics
8. Computer Physics Communications
9. SDU Journal of Science (E-Journal)
10. World Applied Science Journal.

11. Mathematical and Computer Modeling
12. Journal of Advanced Research in Scientific Computing
13. International Journal of Nonlinear Sciences and Numerical Simulation
14. Bulletin of Iranian Mathematical Society
15. Soft Computing

## Teaching experience

- Numerical Methods
- Numerical Analysis 1, 2
- Numerical Linear Algebra
- Computer Foundation
- Operational Research 1
- Advanced Operational Research

## Publications

1. F. Panjeh Ali Beik and D.K. Salkuyeh, *On the global Krylov subspace methods for solving general coupled matrix equations*, Computers and Mathematics with Applications, Accepted (ISI).
2. M. Bastani and D. K. Salkuyeh, *A highly accurate method to solve Fisher's equation*, Pramana-Journal of Physics, accepted (ISI).
3. D. K. Salkuyeh and S. Shamsi, *A Preconditioner for the SOR-like Method for the Augmented Systems*, Chiang Mai Journal of Science, accepted (ISI).
4. M. Bastani and D.K. Salkuyeh, *Numerical studies of a non-local parabolic partial differential equations by spectral collocation method with preconditioning*, Computational Mathematics and Modeling (Springer), Accepted.
5. D. K. Salkuyeh, *A short note on the paper "Convergence of the TAGE iterative method for the system arisen from the cubic spline approximation for the solution of two-point BVPs with forcing function in integral form", by Mohanty, Jain and Dhall*, Applied Mathematical Modelling, 36 (2012) 168-172 (ISI).
6. D. K. Salkuyeh and Y. Abdolalizadeh, *On the Preconditioning of the AOR Iterative Methods for M-matrices*, International Journal of Applied Mathematics and Computation, 3 (2011) 87-94.
7. D. K. Salkuyeh and M. Bastani, *Convergence of the variational iteration method for the cubic nonlinear Schrodinger equation*, Journal of Advanced Research in Scientific Computing, 3(2) 2011, 31-41.

8. D. K. Salkuyeh, *Generalized AOR Method for Solving System of Linear Equations*, Australian Journal of Basic and Applied Sciences, 5 351-358 2011 (ISI).
9. D. K. Salkuyeh and S. Behnejad, *Letter to the Editor regarding "Modified Hermitian and skew-Hermitian splitting methods for non-Hermitian positive-definite linear systems" [Numer. Linear Algebra Appl. 14 (2007) 217-235]*, Numerical Linear Algebra with Applications, Published electronically (ISI).
10. D. K. Salkuyeh and S. H. Azizi, *Gauss-Seidel iterative methods for rank deficient least squares problems*, International Journal of Computational and Mathematical Sciences, 5 (2011) 125-129.
11. D. K. Salkuyeh, *On the solution of the fuzzy Sylvester equation*, Soft Computing, 15 (2010) 953-961 (ISI).
12. D. K. Salkuyeh, H. Roohani, *Convergence of the Variational Iteration Method for the Telegraph Equation with Integral Conditions*, Numerical Methods for Partial Differential Equations, 27 (2011) 1442-1455 (ISI).
13. D. K. Salkuyeh, A. Fahim, *A New Iterative Refinement of the Solution of Ill-Conditioned Linear System of Equations*, International Journal of Computer Mathematics, 88 (5) (2011) 950-956 (ISI).
14. D. K. Salkuyeh, *Stepsize control of the finite difference method for solving ordinary differential equations*, International Journal of Applied Mathematics and Computer Sciences 5 (2009) 234-38.
15. D. K. Salkuyeh and H. Roohani, *On the relation between the AINV and the FAPINV algorithms*, International Journal of Mathematics and Mathematical Sciences, Volume 2009, Article ID 179481, 6 pages (Hindawi Publishing Corporation).
16. D. K. Salkuyeh, *A Sparse Approximate Inverse Preconditioner for Nonsymmetric Positive Definite Matrices*, Journal of Applied Mathematics and Informatics, 28 (2010) 1131-1141.
17. D. K. Salkuyeh, *On the semi-discretization of the Sivashinsky equation*, International Journal of Applied Mathematics and Computation, 2 (2009) 94-100.
18. H. Roohani and D. K. Salkuyeh, *New General Solutions for the General Elliptic and Auxiliary Equations and Application to the Coupled KdV Equation*, International Journal of Computer Mathematics, 87 (12) (2010) 2760-2768 (ISI).
19. D. K. Salkuyeh and F. Toutounian, *Optimal Iterate of the Power and Inverse Iteration Methods*, Applied Numerical Mathematics, 59 (2009) 1537-1548 (ISI).
20. D. K. Salkuyeh and F. Toutounian, *A Sparse-Sparse Iteration for Computing a Sparse Incomplete Factorization of the Inverse of an SPD Matrix*, Applied Numerical Mathematics, 59 (2009) 1265-1273 (ISI).
21. D. K. Salkuyeh, *A preconditioner for the normal equations*, Journal of Applied Mathematics and Informatics, 28 (2010) 687-696.
22. D. K. Salkuyeh and Mohsen Hasani, *A note on the pin-pointing solution of ill-conditioned linear system of equations*, International Journal of Computer Mathematics, 87 (2010) 1395-1400 (ISI).
23. D. K. Salkuyeh and F. Saadati Sharafeh, *On the Numerical Solution of the Burgerss Equation*, International Journal of Computer Mathematics, 86(2009) 1334-1344 (ISI).
24. D. K. Salkuyeh, *The relation between the FSAI and the AIB algorithms*, IUST International Journal of Engineering Science, 19 (2008) 45-48 (ISC).

25. D. K. Salkuyeh, *On the Preconditioning of the Block Tridiagonal Linear System of Equations*, Journal of Applied Mathematics and Computing, 28 (2008) 133-146.
26. D. K. Salkuyeh, F. Toutounian and H. Shariat Yazdi, *A procedure with stepsize control control for solving  $n$  one-dimensional IVPs*, Mathematics and Computers in Simulation, 79 (2008) 167-176 (ISI).
27. D. K. Salkuyeh, *Convergence of the variational iteration method for solving linear systems of ODEs with constant coefficients*, Computers and Mathematics with Applications, 56 (2008) 2027-2033 (ISI).
28. D. K. Salkuyeh, *A family of Newton-type methods for solving nonlinear equations*, International Journal of Computer Mathematics, 84 (2007) 411-419 (ISI).
29. D. K. Salkuyeh, *Generalized Jacobi and the Gauss-Seidel Methods for Solving Linear System of Equations*, Numerical Mathematics: A journal of Chinese universities English Series), 16 (2007) 164-170 (ISI).
30. S. Karimi, D. K. Salkuyeh and F. Toutounian, *A preconditioner for the LSQR algorithm*, Journal of Applied Mathematics and Informatics, 26 (2008) 213 - 222.
31. . D. K. Salkuyeh, S. Karimi and F. Toutounian, *A parallel algorithm to approximate inverse factors of a matrix via sparse-sparse iterations*, Appl. Math. Comput., 81 (2006) 782-79 (ISI).
32. D. K. Salkuyeh, *Positive integer powers of the tridiagonal Toeplitz matrices*, International Mathematical Forum, 22 (2006) 1061 - 1065.
33. D. K. Salkuyeh, *On the finite difference approximation to the convection-diffusion equation*, Appl. Math. Comput., 179 (2006) 7986 (ISI).
34. D. K. Salkuyeh and F. Toutounian, *Numerical accuracy of a certain class of iterative methods for solving linear systems*, Appl. Math. Comput., 176 (2006) 727-738 (ISI).
35. D. K. Salkuyeh, *on the solution of a class of elliptic problems*, International Mathematical Forum, 10(2006)485-494
36. D. K. Salkuyeh, *Comments on A three-term recurrence for tridiagonal systems*, Appl. Math. Comput., 176 (2006) 442-444 (ISI).
37. D. K. Salkuyeh, *A new approach to compute sparse approximate inverse factors*, Appl. Math. Comput., 174(2006)1110-1121 (ISI).
38. D. K. Salkuyeh and F. Toutounian, *New approaches for solving large sylvester equations*, Appl. Math. Comput., 173 (2006) 9-18 (ISI).
39. D. K. Salkuyeh, *CG-type algorithms to solve symmetric matrix equations*, Appl. Math. Comput., 172(2006) 985-999 (ISI).
40. D. K. Salkuyeh and F. Toutounian, *A comparison between GMRES and the global GMRES Methods for solving Matrix Equations*, Jour. of Inst. of Math. and Comp. Sci. (Math. Ser), 17 (2004) 191-195.
41. F. Toutounian, D. K. Salkuyeh and B. Asadi, *Numerical implementation of the QMR algorithm by using discrete stochastic arithmetic*, Journal of Applied Mathematics and Computing, 17 (2005) 457-473.
42. D. K. Salkuyeh and F. Toutounian, *A new approach to compute sparse approximate inverse of an SPD*, IUST International Journal of Engineering Science, 15 (2004) 87-95 (ISC).

43. D. K. Salkuyeh and F. Toutounian, *A block version algorithm to approximate inverse factors*, Applied Mathematics and Computation 162 (2005) 1499-1509 (ISI).
44. D.K. Salkuyeh and F. Toutounian, *BILUS: A Block Version of ILUS Factorization*, Journal of Applied Mathematics and Computing, 15 (2004) 299-312.
45. A. Kerayechian and D. K. Salkuyeh, *On the existence, uniqueness and approximation of a class of elliptic problems*, International Journal of Applied Mathematics, 11 (2002) 49-60.
46. D. K. Salkuyeh, *Erratum to: A numerical solution technique for a one-dimensional inverse nonlinear parabolic problem [Appl. Math. Comput. 184 (2) (2007) 308315]*, Appl. Math. Comput., Vol.189(2007)20-23 (ISI).
47. D. K. Salkuyeh, *A new implementation of the AIB algorithm for computing the inverse factors of a matrix*, Journal of Science and Technology (University of Mohaghegh Ardabili), 3(2006) 33-43.

## Presentations

1. D. Khojasteh Salkuyeh, *On the parallel version of the BAIB algorithm*, 37th Annual Iranian Mathematics Conference, Azarbaijan University of Tarbiat Moallem, Tabriz, Iran.
2. D. Khojasteh Salkuyeh, *A generalization of the SOR method for solving linear system of equations*, The 1st national conference of mathematics and its applications, Islamic Azad university of Lahijan, 5-6 March 2008.
3. K. Shayesteh, A. Heydari, D. K. Salkuyeh, M. Abdorrahmani and N. Barahmati, *Modeling of three-way catalytic converters: Study of heat transfer and chemical reactions*, The 11th National Iranian Chemical Engineering Congress, 2007.
4. D. K. Salkuyeh, T. Salimi, *A Preconditioner for the Normal Equations*, 5 th seminar on Linear Algebra and its applications, Babolsar, Mazandaran, 2009.
5. H. Roohani and D. Khojasteh Salkuyeh, *On the preconditioning based upon the FFAPINV algorithm*, The 23rd International Conference of the Jangjeon Mathematical Society, February 8-10, 2010, Ahvaz-Iran.
6. D. K. Salkuyeh, S. Shamsi, *Generalized SOR method for Solving System of Linear Equations*, 41st Annual Iranian Conference of Mathematics, September 12-15, 2010, Urmia University, Urmia-Iran.
7. D. Khojasteh Salkuyeh, *A Review of the Preconditioning Techniques Based on the FAPINV Algorithm*, The 42nd Annual Iranian Mathematics Conference, 5-8 September 2011, Vali-e-Asr University of Rafsanjan, Iran (Invited speaker).
8. D. Khojasteh Salkuyeh and N. Babazadeh, *Some results on the preconditioned AOR iterative methods*, The 42nd Annual Iranian Mathematics Conference, 5-8 September 2011, Vali-e-Asr University of Rafsanjan, Iran.
9. D. Khojasteh Salkuyeh, *A Generalization of the 2D-DSPM for Solving Linear System of Equations*, The fourth national mathematics conference, Payameh Noor, September 25 and 26, Ardabil.
10. D. Khojasteh Salkuyeh and Y. Darabi, *Hybrid methods to solve matrix equations*, The fourth national mathematics conference, Payameh Noor, September 25 and 26, Ardabil.

## Research projects

1. A new approach to compute sparse approximate inverse of a matrix.
2. On the finite difference approximation to the Convection-Diffusion equation.
3. Generalization of some stationary iterative methods for solving large sparse linear system of equations.
4. On the BAIB algorithm for computing the sparse approximate inverse factors of a matrix.
5. Approximate solution of the Sivashinsky equation by using its semi-discretization.
6. On the preconditioning of the block tridiagonal linear system of equations.
7. Optimal iterate of the power and inverse iteration methods.
8. ILU preconditioning based on the FAPINV algorithm.
9. Stepsize control for interpolating cubic spline functions.
10. On the solution of the fuzzy Sylvester equation.
11. A generalization of the AOR iterative method.

## M.Sc students

1. Fazel Saadati Sharafeh, Weighted FOM and GMRES for solving nonsymmetric linear systems, Advisor: H. Saberi Nadjafi (Guilan university), defence date: December 14, 2007.
2. Mohammad Reza Arian, Investigation of the global FOM and GMRES for solving matrix equations, defence date: August 29, 2007.
3. Mohsen Hasani, Preconditioned accelerated overrelaxation iterative method for solving linear systems of equations, defence date: June 25, 2008.
4. Mehdi Bakhshizadeh, The incomplete orthogonalization method for solving large linear system of equations, Advisor: Dr. Faezeh Toutounian (Ferdowsi University of Mashhad), defence date: July 24, 2008.
5. Sholeh Yaghoobi Kaloorazi, Generalization of an iterative method for solving SPD linear system of equations, Second supervisor: Dr. Mohammad Zarebnia (University of Mohaghegh Ardabili). defence date: November 9, 2008.
6. Roya Tabatabaei Ebrahimi, A fast implementation for the GMRES method, Co-Advisor: Dr. Mir Kamal Mirnia (Tabriz University), defence date: November 7, 2008.
7. Mohammad Nasiri, Hermitian and skew-Hermitian splitting methods for solving non-Hermitian positive definite linear system of equations, defence date: January 18, 2009.

8. Hadi Rohani, A method for preconditioning of the linear system of equations by using the inverse factors of a matrix, defence date: January 18, 2009.
9. Amir Sadeghi Marasht, Numerical solution of integral equations by means of the Sinc collocation method based on the double exponential transformation, Supervisor: Dr. Mohammad Zarebnia, Advisor: D. Khojasteh Salkuyeh, defence date: October 17, 2008.
10. Tahereh Salimi, A new preconditioner for the normal equations, defence date: December 31, 2009.
11. Atefeh Fahim, Semiconvergence of extrapolated iterative methods for solving singular linear system of equations, Defence date: December 2, 2009.
12. Sommayeh Shamsi, Modified symmetric successive overrelaxation method for solving saddle-point problems, Defence date: December 17, 2009.
13. Shiva Behnejad, Modified Hermitian and skew-Hermitian splitting methods for non-Hermitian positive definite linear system of equations, defence date: October 12, 2010.
14. Sayyed Hasan Azizi Chaparparadi, Accelerated overrelaxation iterative method for rank deficient least squares problems, defence date: November 23, 2010.
15. Yousef Abdolalizadeh, Preconditioned accelerated overrelaxation iterative methods for M-matrices, defence date: November 23, 2010.
16. Tahereh Houshangi Shafti, Double splitting methods for solving system of linear equations, October 19, 2011.
17. Ameneh Azarnejad Hassankiadeh, Convergence of generalized AOR iterative method for linear systems of equations with strictly diagonally dominant matrices, October 19, 2011.
18. Akbar Ramazani, A parallel iterative algorithm for solving 2D Poisson equation, defence date: July 30, 2011.
19. Mehdi Bastani, Compact finite difference method for solving differential and integro-differential equations, defence date: July 30, 2011.
20. Younes Darabi, An iterative method for solving linear matrix equations, defence date: September 27, 2011.
21. Fatemeh Heydari Kharaji, Non-Archimedean L-fuzzy normed spaces and stability of functional equations (Advisor: Dr. N. Egbali, Co-Advisor: D.K. Salkuyeh), defence date: September 15, 2011.
22. Hadi Feyzollahzadeh, Preconditioned MHSS iteration methods for complex symmetric linear system of equations, In progress.
23. Sayyedeh Khadijeh Mousavi Mohammadi, Iterative methods to compute special solutions to the system of generalized Sylvester equations, In progress.
24. Salimeh Naseri Nanekaran, Numerical algorithms for computing the Moore-Penrose inverse of a matrix, In progress.
25. Zeynab Hassanzadeh, Two-stage waveform relaxation methods for initial value problems, In progress.



## Book

1) Numerical Methods in Linear Algebra (in persian), 350 pages.  
Publisher: Amoozeshhayeh Bounyadi (<http://amath.ir>).

Book chapters:

1. Introduction
2. Inner product and norm
3. Linear system of equations
4. Eigenvalue problems
5. Singular value decomposition and its applications
6. Matrix functions and their applications
7. Iterative methods for solving linear system of equations
8. Nonnegative matrices