

Curriculum Vitae of Faezeh Toutounian

Qualifications

- BSc in Mathematics, Ferdowsi university of Mashhad, Iran
- MSc in Mathematical Statistics (1971) Paris VI university, France
- MSc in Applied Computer (1975), Paris VI university, France
- PhD in Mathematics, Paris VI university, France (1975)

Scientific Positions

- Member of the Executive committee of Iranian Society of Mathematics (2000- 2003)
- Member of the Editorial Board of Iranian Journal of Numerical Analysis and Optimization (IJNAO) (2006-now)
- Member of the Center of Excellence on Modeling and Control Systems, Ferdowsi University of Mashhad, Iran (2007-now)

Research Interests

- Numerical linear algebra
- Iterative methods
- Error analysis

Teaching

- " Numerical linear algebra" (MSc and PhD courses) ("Numerical linear algebra and applications", Baiwa Natt Datta and "Introduction to numerical analysis", J. Stoer and R. Bulirsch)
- " Iterative methods for solving linear systems" (PhD course) ("Iterative methods for sparse linear systems", Y. Saad)
- " Numerical analysis" (MSc and BSc courses) (" Numerical analysis", D. Kincaid and W. Cheney and "Introduction to numerical analysis", J. Stoer and R. Bulirsch).
- " Operations research" (MSc and BSc courses) ("Linear programming", S. I. Gass and "Linear programming and network flows", M. S. Bazaraa , J. J. Jarvis, and H. D. Sherali)

- "Advanced calculus" (BSc course)

Administrative

- Head of Mathematics department of Ferdowsi University of Mashhad (1999-2001)
- Director of graduate educations (2002-2006)
- Director of the Audit Board of Faculty of Science and Faculty of Mathematical Science (1999-2008)

Awards

- "Winner of the "best translated book in mathematics in academic year 1990-1991" award.
- "Winner of the "best translated book in mathematics in academic year 1993-1994 " award.
- "Winner of the "best translated book in mathematics in academic year 2002-2003 " award.
- "Winner of the "best translated book in sciences in ferdowsi festival (2003)" award.
- "Winner of the "best professor" award (Ferdowsi university) 1998
- "Winner of the "best translated book in sciences in ferdowsi festival (2010)" award.
- "Winner of the "best professor" award (Ferdowsi university) 2011

Memberships

- Member of the Iranian Society of Mathematics

Paper

- S. Amini, F. Toutounian, and M. Gachpazan, The block CMRH method for solving nonsymmetric linear systems with multiple right-hand sides, Journal of Computational and Applied Mathematics 337(2018)166174.
- Neda Mohamadi, Ali R. Soheili, and Faezeh Toutounian, A new hybrid denoising model based on PDEs, Multimedia Tools and Applications (2017)
<https://link.springer.com/article/10.1007/s11042-017-4858-8>

- Mohammad Mahdi Izadkhah, Jafar Saberi-Nadjafi, and Faezeh Toutounian, An extension of the Gegenbauer pseudospectral method for the time fractional Fokker-Planck equation, *Mathematical methods in the applied Sciences* 41(2017)1-15.
- M. Mojarrab and F. Toutounian, Global LSMR(GI-LSMR) method for solving general linear systems with several right-hand sides, *Journal of Computational and Applied Mathematics* 321 (2017) 7889.
- Faezeh Toutounian and Reza Buzhabadi, New methods for computing the Drazin-inverse solution of singular linear systems, *Journal of Applied Mathematics and Computation* 294 (2017) 343352.
- Mohammad Khorsand Zak and Faezeh Toutounian, A shifted nested splitting iterative method with applications to ill-posed problems and image restoration, *Journal of Computers and Mathematics with Applications* 71 (2016) 213223
- Mohammad Khorsand Zak and Faezeh Toutounian, An iterative method for solving the continuous Sylvester equation by emphasizing on the skew-Hermitian parts of the coefficient matrices, *International Journal of Computer Mathematics*, Taylor & Francis publishing <http://dx.doi.org/10.1080/00207160.2015.1120863>
- Ali R. Soheili, F. Toutounian, F. Soleymani, A fast convergent numerical method for matrix sign function with application in SDEs, *Journal of Computational and Applied Mathematics* 282 (2015) 167-178.
- F. Toutounian and Maryam Mojarrab, The block LSMR method: a novel efficient algorithm for solving non-symmetric linear systems with multiple right-hand sides, *IJST* (2015) 39A1: 69-78 *Iranian Journal of Science & Technology*.
- F. Toutounian and Maryam Mojarrab, The block LSMR algorithm for solving linear systems with multiple right-hand sides, *Iranian Journal of Numerical Analysis and Optimization* Vol. 5, No. 2, (2015), pp 11-28
- F. Toutounian, D. Khojasteh Salkuyeh, and M. Mojarrab, LSMR Iterative Method for General Coupled Matrix Equations, *Hindawi Publishing Corporation Journal of Applied Mathematics* Volume 2015, Article ID 562529, 12 pages <http://dx.doi.org/10.1155/2015/562529>.
- Reza Behzadi, Emran Tohidi, Faezeh Toutounian, Numerical solution of weakly singular Fredholm integral equations via generalization of the EulerMaclaurin summation formula, *Journal of Taibah University for Science* 8 (2014) 199205.
- Emran Tohidi, Faezeh Toutounian, Numerical solution of time-dependent diffusion equations with nonlocal boundary conditions via a fast matrix approach, *Journal of*

the Egyptian Mathematical Society (2014),
<http://dx.doi.org/10.1016/j.joems.2014.06.018>.

- Emran Tohidia, Faezeh Toutounian, Convergence analysis of Bernoulli matrix approach for one-dimensional matrix hyperbolic equations of the first order, *Computers & Mathematics with Applications* Volume 68, Issues 12, July 2014, Pages 112.
- F. Toutounian, H. Nasabzadeh, A new method based on generalized Taylor expansion for computing a series solution of the linear systems, *Applied Mathematics and Computation* 248 (2014) 602609.
- H. Nasabzadeh F. Toutounian, Convergent Homotopy Analysis Method for Solving Linear Systems, *Advances in Numerical Analysis* Volume 2013, Article ID 732032, 6 pages, Hindawi Publishing <http://dx.doi.org/10.1155/2013/732032>
- F. Toutounian, Soleymani, An iterative method for computing the approximate inverse of a square matrix and the Moore-Penrose inverse of a non-square matrix, *Applied mathematics and computation*, 224 (2013) 671-680.
- F. Toutounian, Emran Tohidi, A new Bernoulli matrix method for solving second order linear partial differential equations with the convergence analysis, *Applied mathematics and computation* 223(2013)298-310
- Mohammad Khorsand Zak, Faezeh Toutounian, Nested splitting conjugate gradient method for matrix equation $AXB=C$ and preconditioning, *Computer and mathematics with application*, *Computers and Mathematics with Applications*, Volume 66, Issue 3, September 2013, Pages 269-278
- Faezeh Toutounian, Emran Tohidi, and A. Kilicman, Fourier Operational Matrices of Differentiation and Transmission: Introduction and Applications, Hindawi Publishing Corporation, *Abstract and Applied Analysis*, Volume 2013, Article ID 198926, 11 pages, <http://dx.doi.org/10.1155/2013/198926>,
- Faezeh Toutounian, Emran Tohidi, and Stanford Shateyi, A Collocation Method Based on the Bernoulli Operational Matrix for Solving High-Order Linear Complex Differential Equations in a Rectangular Domain, Hindawi Publishing Corporation, *Abstract and Applied Analysis*, Volume 2013, Article ID 823098, 12 pages, <http://dx.doi.org/10.1155/2013/823098>
- F. Toutounian and A. Akhondi, Recursive Self Preconditioning Method Based on Schur Complement for Toeplitz Matrices, *Numer Algor*, Volume 2012 DOI 10.1007/s11075-012-9603-9
- Khorsand Zak and F. Toutounian, Nested splitting CG-like iterative method for solving the continuous Sylvester equation and preconditioning, Hindawi Publishing, *Adv Comput Math* DOI 10.1007/s10444-013-9330-3

- H. Nasabzadeh and F. Toutounian, A new generalized AOR iterative method for solving linear systems, *International Journal of Applied Mathematical Research*, 2 (4) (2013) 439-451.
- F. Toutounian and D. Hezari, Accelerated normal skew-Hermitian splitting methods for positive definite linear systems, *Iranian Journal of Numerical Analysis and Optimization*, Iranian J. Numerical Analysis and Optimization Vol 3 No. 1 (2013) 31-34.
- Akhondi and F. Toutounian, Accelerated Circulant and Skew-circulant Splitting Methods for Hermitian Positive Definite Teoplitz, Hindawi Publishing Corporation, *Advances in Numerical Analysis*, Volume 2012, Article ID 973407, 17 pages, <http://dx.doi.org/10.1155/2012/973407>
- S. Karimi and F. Toutounian, On the convergence of BI-LSQR algorithm for solving matrix equations, *International Journal of Computer Mathematics*, vol. 88. No. 1 (2011), 171-182
- Mahdieh Momenzadeh, Jamshid Darvish, Faezeh Toutounian, Majid Sarmad, and Fereshteh Sadeghi Shakib, Investigation of climate effects on the shape and volume of tympanic of *Meriones libycus* and *M. persicus* (Muridae: Rodentia) from Northeastern Iran, *Iranian Journal of Animal and Biosystematics*, 4 (2008) 63-73
- F. Toutounian, J. Saberi-Nadjafi, and S. H. Taheri, A Hybrid of the Newton-GMRES and Electromagnetic Meta-Heuristic Methods for Solving Systems of Nonlinear Equations, *Journal of Mathematic Modeling Algorithm* 8 (2009) 425-443
- F. Toutounian and A. Ataei, A new method for computing Moore-Penrose matrices, *Journal of Computational and Applied Mathematics* 228 (2009) 412-417
- D. Khojasteh Salkuyeh and F. Toutounian, A sparse-sparse iteration for computing a sparse incomplete factorization of the inverse of an SPD matrix, *Journal of Applied Numerical Mathematics* 59 (2009)1265-1273
- D. Khojasteh Salkuyeh and F. Toutounian, Optimal iterate of the power and inverse iteration methods, *Journal of Applied Numerical Mathematics* 59 (2009) 1537-1548
- Rafiei and F. Toutounian, Breakdown-free version of ILU factorization for nonsymmetric positive definite matrices, *Journal of Computational and Applied Mathematics*, Vol 230 (2009) 699-705
- D. Khojasteh Salkuyeh , S. Karimi, and F. Toutounian, A preconditioner for the LSQR, *Journal of Applied Mathematics and informatics*, Vol 26, No 1-2 (2008) 213-222

- Davod Khojasteh Salkuyeh, Faezeh Toutounian, and Hamed Shariat Yazdi, A Procedure with step size control for solving n one-dimensional IVPs, *Mathematics and Computers in Simulation*, journal of Mathematics and Computers in Simulation, Vol 79, No 2 (2008) 167-176.
- A. Rafiei and F. Toutounian, New breakdown-free variant of AINV method for non-symmetric positive definite matrices, *Journal of Computational and Applied Mathematics*, Vol 219 (2008) 72-80
- M. H. Koulaei and F. Toutounian, On computing of block ILU preconditioner for block tridiagonal systems, *Journal of Computational and Applied Mathematics*, Vol 202, No 2 (2007) 248-257
- Kabbi, A. Kerayechian, and F. Toutounian, A new version of successive approximations method for solving Sylvester matrix equations, *Journal of Applied Mathematics and Computation*, Vol 186, No 1 (2007) 638-645
- M. H. Koulaei and F. Toutounian, Factored sparse approximate inverse of block tridiagonal and block pentadiagonal matrices, *Journal of Applied Mathematics and Computation*, Vol 184, No 2 (2007) 223-234
- Kaabi , F. Toutounian, and A. Kerayechian, Preconditioned Galerkin and minimal residual methods for solving Sylvester equations, *Journal of Applied Mathematics and Computation*, Vol 181, No 2 (2006)1208-1214
- D. Khojasteh Salkuyeh , S. Karimi, and F. Toutounian, A parallel algorithm to approximate inverse factors of a matrix via sparse-sparse iterations, *Journal of Applied Mathematics and Computation*, Vol 181, No 1 (2006) 782-792
- F. Toutounian and S. Karimi, Global least squares method (GI-LSQR) for solving general linear systems with several right-hand sides, *Journal of Applied Mathematics and Computation*, Vol 178, No 2 (2006) 552-460
- S. Karimi and F. Toutounian, The block least squares methods for solving nonsymmetric linear systems with multiple right-hand sides, *Journal of Applied Mathematics and Computation*, Vol 177, No 2 (2006) 852-862
- D. Khojasteh Salkuyeh and F. Toutounian, Numerical Accuracy of a certain class of iterative methods for solving linear system, *Journal of Applied Mathematics and Computation*, Vol 176, No 2 (2006) 727-738
- D. Khojasteh Salkuyeh and F. Toutounian, New approaches for solving large Sylvester equations, *Journal of Applied Mathematics and Computation*, Vol 173, No 1 (2005) 9-18

- Kaebi, A. Kerayechian, and F. Toutounian, Approximate inverse preconditioner by computing approximate solution of Sylvester equation, *Journal of Applied Mathematics and Computation*, Vol 170, No 2 (2005) 1067-1076
- F. Toutounian, Determination of a good value of the time step and preconditioned Krylov subspace methods for the Navier-Stokes equations, *Journal of Computer and Mathematics with Applications*, Vol 49, No 7-8 (2005) 1045-1057
- D. Khojasteh Salkuyeh and F. Toutounian, A block version algorithm to approximate inverse factors, *Journal of Applied Mathematics and Computation*, Vol 162 (2005) 1499-1509
- F. Toutounian, D. Khojasteh Salkuyeh, and B. Asadi, Numerical implementation of QMR algorithm by using discrete stochastic arithmetic, *Journal of Applied Mathematics and Computing*, Vol 17, No 1 (2005) 457-473
- D. Khojasteh Salkuyeh and F. Toutounian, A new approach to compute sparse approximate inverse of an spd matrix, *IUST-International Journal of engineering Science*, Vol 4 (2004) 87-95
- D. Khojasteh Salkuyeh and F. Toutounian, A comparison between GMRES and Global GMERES methods for solving matrix equations, *Journal of Institut of Math and Computer Sci of Indian (Math. Ser)*, Vol 17, No 3 (2004) 191-195
- 5- D. Khojasteh Salkuyeh and F. Toutounian, BILUS: A block version of ILUS factorization, *Journal of Applied Mathematics and Computing*, Vol 15, No 1 (2004) 299-312
- 4- F. Toutounian, The stable $A^T A$ -orthogonal s-step orthomin(k) algorithm with CADNA library, *Journal of Numerical Algorithm*, Vol 17 (1998) 105-119
- F. Toutounian, The use of CADNA library for validating the numerical results of hybrids GMRES algorithm, *Journal of Applied Numerical Mathematics* Vol 23, No 2 (1997) 275-289
- F. Toutounian, The exact convergence and divergence domains of the SOR methods for 4-cyclic matrices, *Journal of Institut of Math and Computer Sci of Indian*, Vol 9, No 3 (1996) 233-243
- F. Toutounian, Practical methods for evaluating the accuracy of the eigen elements of a symmetric matrix, *Journal of Math and Computer in simulation* Vol 30, No 6 (1988) 493-504

Books (BOOKS IN FARSI)

- "Linear Programming , Methods and Applications" Translation (1st Ed 1990, 2nd Ed. 1999)
- "Numerical Methods For Mathematics Sciences and Engineering", Translation (1st Ed. 1991, 2nd Ed. 2000)
- "Numerical Algorithms, Computations in Science and Engineering", Translation (1995), with A. Bozorgnia
- "Traitment des donnees statistiques methodes, et programmes", Translation (1995), with H. Sadeghi
- "Elementary Differential Equations with Boundary Value Problems" Translation (1998) with Z. Afsharnejhad
- " Numerical Analysis I and II " Translation (2002), with M. Saemi
- " Numerical Linear Algebra and Applications I and II", Translation (2009)

Theses

PhD THESES SUPERVISED

- " Some developments on iterative methods for solving linear system of equations"
- " The block least squares method for solving matrix equations"
- " Sparse approximate inverse preconditioner for block tridiagonal and block pentadiagonal systems"
- SAINV-NS and RIF-NS preconditioners
- New methods for computing the generalized inverses
- New iterative and direct methods for solving Toeplitz linear system of equations
- Improvement of the basic iterative methods for solving linear systems
- New iterative methods based on the Hermitian and skew-Hermitian splitting for solving matrix equations
- A new approach for numerical solution of some classes of differential and integral equations
- The block LSMR method for solving matrix equations

- Accelerating the convergence of Krylov subspace methods for the Drazin-inverse solution of singular linear systems

Conferences

- F. Toutounian and Maryam Mojarrab, The Block Least Square Method for Solving Non-symmetric Linear Systems with Multiple Right-hand Sides, The Second Khansar Conference on Mathematical Sciences 4th Conference on Mathematical Analysis and its Applications, Faculty of Khansar, Khansar, Iran, May 7-8, 2013
- F. Toutounian, A brief review of the linear stationary first-order iterative methods for solving linear systems, Proceedings of Applied Mathematics Conference (2011)
- F. Toutounian, A brief review of the iterative methods for solving Toeplitz systems, Proceedings of Applied Mathematics Conference (2009)
- "Factorized sparse approximate inverse preconditioners for large linear systems: survey", Proceedings of 38th Iranian Mathematical Conference (2007)
- "GMRES algorithm for singular systems", Proceedings of 37th Iranian Mathematical Conference (2006) with Khademi and Adib
- "Conjugate-Gram-Schmidt process for computing Moore-Penrose inverse Proceedings of 37th Iranian Mathematical Conference (2006) with Ataei
- "Approximate inverse preconditioner by computing solution of Sylvester equation" Proceedings of 35th Iranian Mathematical Conference (2004) with Kaabi and Kerayehchian.
- "The block least squares methods", Proceedings of 35th Iranian Mathematical Conference (2004) with Karimi.
- "A Block version algorithm to approximate inverse factors", Proceedings of 34th Iranian Mathematical Conference (2003) with D. Khojasteh .
- "Numerical accuracy of a class of iterative methods", Proceedings of 33rd Iranian Mathematical Conference (2002) with D. Khojasteh .
- "A New ILP formulation", Proceedings of 33rd Iranian Mathematical Conference (2002), with Zohrebandian and Taghizadeh. " "A review on the sparse-approximate inverse preconditioners suitable for vector and parallel processors", Proceedings of 32nd Iranian Mathematical Conference (2001).
- "On the sensivity of the solution components in linear systems of equations", Proceeding of 2nd seminar on linear algebra and its applications in Iran (2000)

- "The convergence of transpose-free quasi-minimal residual algorithm", Proceedings of 3rd seminar on numerical analysis and its applications in Iran (2000).
- A review on the preconditioners for conjugate gradient methods", Proceeding of 3rd seminar on numerical analysis and its applications in Iran (2000)
- "QMR algorithm in stochastic arithmetic", Proceedings of 31st Iranian Mathematical Conference (2000), with Asdi.
- "Recent developments in iterative solution methods for solving sparse linear system", Proceeding of the 1st seminar of women and mathematics in Iran (2000)
- "Block preconditioning for the CG method in solving implicit difference schemes for 2-D Navier Stokes equations", Proceeding of 30th Iranian Mathematical Conference (1999).
- "Stable iterative algorithm for solving large system with the CADNA library", Proceedings of 2nd seminar on numerical analysis and its applications (1999).
- "Performance of GMRES and BICGSTAB methods in solving implicit difference schemes for 2- D Navier Stokes equations", Proceedings of 2nd seminar on differential equations, dynamical systems and their applications (1998).
- "ConjugateGradient (CG) acceleration procedures for SAOR method", Proceeding of 26th Iranian Mathematical Conference (1995)
- "Evaluation des parameteres optimals des methodes de AOR et GAOR", Proceedings of International Congress of Mathematicians (1994), Swiss.
- "Practical methods for evaluating the accuracy of eigen elements of a symmetric matrix", Proceedings of 18th Iranian Mathematical Conference (1987).
- "Generalized conjugate-gradient acceleration of nonsymmetrizable iterative methods", Proceedings of 25th Iranian Mathematical Conference (1994).
- "Evaluation of the optimum parameters of AOR and GAOR methods", Proceedings of 24th Iranian Mathematical Conference (1993).
- "determination of optimum step for numerical solution of ordinary differential equations", Proceeding of 21st Iranian Mathematical Conference (1990).
- "Une methode peatique pour evaluer la precision des element propres d'une matrice reelle", Proceeding of International Congress of Mathematicians (1990), Japan
- "The calculation of the multiple roots of a polynomial and evaluation of the accuracy of them " ,Proceedings of 20th Iranian Mathematical Conference (1989)