



# Fatemeh P. A. Beik

## Curriculum Vitae

*"Mathematics knows no races or geographic boundaries; for mathematics, the cultural world is one country. - David Hilbert*

### Personal Information

Full name: Fatemeh Panjeh Ali Beik (Beik, F. P. A.)  
Academic rank: Associate professor.  
Affiliation: Vali-e-Asr University of Rafsanjan (Department of Mathematics).  
Place of birth: Tehran, Iran.  
Year of birth: 1981.  
Citizenship: Iranian.

### Teaching Materials

- Topics on Numerical Linear Algebra (Ph. D. course)
- Topics on Iterative Methods for Solving Linear Systems (Ph. D. course)
- Control & System theory (Ph. D. course)
- Advanced Numerical Analysis (M. Sc. course)
- Approximation Theory (M. Sc. course)
- Numerical Methods in Linear Algebra (M. Sc. course)
- Calculus (B. Sc. course)
- Numerical Analysis (B. Sc. course)
- Numerical Linear Algebra (B. Sc. course)

### Research Interests

Studying the performance of (preconditioned) iterative methods to solve linear and multi-linear (tensor) operator equations.

### Educations

2007–2010 **Ph.D. of Applied Mathematics**, *Shahid Bahonar University of Kerman*, Kerman, Iran.

2005–2007 **Master of Applied Mathematics**, *Shahid Bahonar University of Kerman*, Kerman, Iran.

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2000–2005 **Bachelor of Applied Mathematics**, *Vali-e-Asr University of Rafsanjan*, Rafsanjan, Iran.

## Ph.D. Thesis

Title *Iterative methods for solving large and sparse linear system of equations*  
Supervisor Professor Mahmoud Mohseni Moghadam  
Advisor Professor Abbas Salemi Parizi

## Honors

- 2007 Ranked first among all master students of Applied Mathematics, Shahid Bahonar University of Kerman.
- 2013 Outstanding young researcher of Vali-e-Asr University of Rafsanjan.
- 2015 Outstanding researcher of the Department of Mathematics, Vali-e-Asr University of Rafsanjan
- 2016 Outstanding researcher of the Faculty of Mathematical and Computer Sciences, Vali-e-Asr University of Rafsanjan
- 2018 Winner of Prof. Riazi Kermani Award in 2018; The awarded is for the best paper presented in the annual Iranian math conference

## Memberships

- 2011–present **Member of Iranian Math. Soc.**
- 2013–present **Member of American Math. Soc.**
  - 2011 **Member of scientific committee of 42nd Annual Iranian Conference**, *Vali-e-Asr University of Rafsanjan*, Rafsanjan, Iran.
  - 2014 **Member of scientific committee; 5th Conference of Numerical Analysis and its Applications**, *Vali-e-Asr University of Rafsanjan*, Rafsanjan, Iran.
  - 2018 **Member of scientific committee; 7th Conference of Numerical Analysis and its Applications**, *Shahid Bahonar University of Kerman*, Kerman, Iran.

## Editorial Boards

- 2017–present **Wavelet and Linear Algebra (WALA).**

## Sabbatical leave

2016–2017 **Department of Mathematics and Computer Science**, *Scientific Computing Group*, Emory University, Atlanta, GA 30322, USA.  
Host: Prof. Michele Benzi

## Selected Papers

- M. Najafi-Kalyani, F. P. A. Beik and K. Jbilou, On global iterative schemes based on Hessenberg process for (ill-posed) Sylvester tensor equations, *Journal of Computational and Applied Mathematics*, Available online, DOI: 10.1016/j.cam.2019.03.045. (JCR)

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- M. Benzi, F. P. A. Beik, S.-H. A. Chaparpordi and Z. Roygar, Generalized iterative methods for solving double saddle point problem, *Mathematical Researches*. 2020; 6 (1) (In Persian).
- S.-H. A. Chaparpordi, F. P. A. Beik and D. K. Salkuyeh, Block triangular preconditioners for stabilized saddle point problems with nonsymmetric  $(1, 1)$ -block, *Computers & Mathematics with Applications*. 76 (2018), no. 6, 1544-1553. (JCR)
- F. P. A. Beik and M. Benzi, Block preconditioners for saddle point systems arising from liquid crystal directors modeling, *CALCOLO*, 55 (2018) 29 DOI: 1–1810.1007/s10092-018-0271-6. (JCR)
- F. P. A. Beik and M. Benzi, Iterative methods for double saddle point systems, *SIAM Journal on Matrix Analysis and Applications*. 39 (2018), no. 2, 902–921. (JCR)
- M. Benzi and F. P. A. Beik, Uzawa-type and augmented Lagrangian methods for double saddle point systems, to appear in D. Bini, F. Di Benedetto, E. Tyrtyshnikov, and M. Van Barel (eds.), "Structured Matrices in Numerical Linear Algebra: Analysis, Algorithms and Applications", Springer INdAM Series, 2018 (18 pages).
- A. Ameri and F. P. A. Beik, Delayed over-relaxation in iterative schemes to solve rank deficient linear systems of (matrix) equations, *FILOMAT*, 32 (2018), no. 9, 3181–3198. (JCR)
- F. P. A. Beik, S. Ahmadi-Asl and A. Ameri, On the iterative refinement of the solution of ill-conditioned linear system of equations, *International Journal of Computer Mathematics*, 95 (2018),no. 2, 427–443. (JCR)
- F. P. A. Beik, M. Benzi and S.-H. A. Chaparpordi, On block diagonal and block triangular iterative schemes and preconditioners for stabilized saddle point problems, *Journal of Computational and Applied Mathematics*, 326 (2017) 15–30. (JCR)
- F. P. A. Beik and D. K. Salkuyeh, A cyclic iterative approach and its modified version to solve coupled Sylvester–transpose matrix equations, *Linear and Multilinear Algebra*, 65 (2017), no. 12, 2406–2423. (JCR)
- S. Ahmadi-Asl and F. P. A. Beik, An efficient iterative algorithm for quaternionic least-squares problems over the generalized  $\eta$ -(anti-)bi-Hermitian matrices, *Linear and Multilinear Algebra*, 65 (2017), no. 9, 1743–1769. (JCR)
- D. K. Salkuyeh, F. P. A. Beik, D. Hezari, A sequential two-stage method for solving generalized saddlepoint problems, *UPB Scientific Bulletin, Series A: Applied Mathematics and Physics*, 79 (2017), no. 1, 131–140. (JCR)
- S. Ahmadi-Asl and F. P. A. Beik, Iterative algorithms for least-squares solutions of a quaternion matrix equation, *Journal of Applied Mathematics and Computing*, 53 (2017), no. 1, 95–127.
- F. P. A. Beik and D.K. Salkuyeh, An iterative algorithm for the best approximate  $(P, Q)$ -orthogonal symmetric and skew-symmetric solution pair of coupled matrix equations, *Transactions of the Institute of Measurement and Control*, 39 (2017), no. 4, 537–554. (JCR)
- D. K. Salkuyeh, M. Hasani and F. P. A. Beik, On the preconditioned AOR iterative method for Z-matrices, *Computational & Applied Mathematics*, 36 (2017), 877–883. (JCR)
- F. P. A. Beik, On a general class of preconditioners for nonsymmetric generalized saddle point problems, *UPB Scientific Bulletin, Series A: Applied Mathematics and Physics*, 78 (2016), no. 4, 211–220. (JCR)
- F. P. A. Beik, F. S. Movahed and S. Ahmadi-Asl, On the Krylov subspace methods based on tensor format for positive definite Sylvester tensor equations, *Numerical Linear Algebra with Applications*, 23 (2016), no. 3, 444–466. (JCR)
- F. P. A. Beik and S. Ahmadi-Asl, An iterative algorithm for  $\eta$ -(anti)-Hermitian least-squares solutions of quaternion matrix equations, *Electronic Journal of Linear Algebra (ELA)*, 30 (2015)

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- 372–401. (JCR)
- F. P. A. Beik and D.K. Salkuyeh, An iterative algorithm for the least squares solutions of matrix equations over symmetric arrowhead matrices, *Journal of the Korean Mathematical Society*, 52 (2015) 349–372. (JCR)
  - F. P. A. Beik and D.K. Salkuyeh, Weighted versions of GI-FOM and GI-GMRES for solving general coupled linear matrix equations, *Computational Mathematics and Mathematical Physics*, 55 (2015), no. 10, 1606–1618. (JCR)
  - F. P. A. Beik and N. N. Shams, On the modified iterative methods for M-matrix linear system, *Bulletin of the Iranian Mathematical Society (BIMS)*, 41 (2015), no. 6, 1519–1535. (JCR)
  - D. K. Salkuyeh and F. P. A. Beik, Minimum norm least-squares solution to general complex coupled linear matrix equations via iteration, *FILOMAT*, 29 (2015) 1389–1407.(JCR)
  - F. P. A. Beik and S. Ahmadi-Asl, Residual norm steepest descent based iterative algorithms for Sylvester tensor equations, *Journal of Mathematical Modeling*, 2 (2015) 115–131. (JCR)
  - F. P. A. Beik and D.K. Salkuyeh, A finite iterative algorithm for Hermitian reflexive and skew-Hermitian solution groups of the general coupled linear matrix equations, *Journal of Applied Mathematics and Computing*, 48 (2015) 129-155.
  - F. P. A. Beik, A modified iterative algorithm for the (Hermitian) reflexive solution of the generalized Sylvester matrix equation, *Transactions of the Institute of Measurement and Control*, 36 (2014), no. 6, 815–827. (JCR)
  - F. P. A. Beik and M. M. Moghadam, The general coupled linear matrix equations with conjugate and transpose unknowns over the mixed groups of generalized reflexive and anti-reflexive matrices, *Computational & Applied Mathematics*, 33 (2014) 795–820. (JCR)
  - D. K. Salkuyeh and F. P. A. Beik, On the gradient based algorithm for solving the general coupled matrix equations, *Transactions of the Institute of Measurement and Control*, 36 (2014), no. 3, 375–381. (JCR)
  - F. P. A. Beik, Theoretical results on the global GMRES method for solving generalized Sylvester matrix equations, *Bulletin of the Iranian Mathematical Society (BIMS)*, 40 (2014), no. 5, 1097–1117.(JCR)
  - F. P. A. Beik and N. N. Shams, Preconditioned generalized mixed-type splitting iterative method for solving weighted least squares problems, *International Journal of Computer Mathematics*, 91 (2014), no. 5, 944–963. (JCR)
  - F. P. A. Beik, D.K. Salkuyeh and M. M. Moghadam, Gradient based iterative algorithm for solving the generalized coupled Sylvester-transpose and conjugate matrix equations over reflexive (anti-reflexive) matrices, *Transactions of the Institute of Measurement and Control*, 36 (2014), no. 1, 99-110. (JCR)
  - D.K. Salkuyeh and F. P. A. Beik, An iterative method to solve symmetric positive definite matrix equations, *Mathematical Reports*, 16 (2014), no. 2, 271–283. (JCR)
  - F. P. A. Beik and D.K. Salkuyeh, The coupled Sylvester-transpose matrix equations over generalized centro-symmetric matrices, *International Journal of Computer Mathematics*, 90 (2013), no. 7, 1546-1566. (JCR)
  - M. M. Moghadam and F. P. A. Beik, Comparison results on the preconditioned mixed-type splitting iterative method for M-matrix linear systems, *Bulletin of the Iranian Mathematical Society (BIMS)*, 38 (2012), no. 2, 349-367. (JCR)
  - F. P. A. Beik and D.K. Salkuyeh, On the global Krylov subspace methods for solving general coupled matrix equations, *Computers & Mathematics with Applications*, 62 (2011), no. 11, 4605-4613. (JCR)

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## Conference Papers

- M. M. Moghadam and F. P. A. Beik, Improving block Gauss-Seidel iterative method for solving Z-matrix linear systems, The 39th Annual Iranian Mathematics conference, Shahid Bahonar University of Kerman, Kerman (2007)
- M. M. Moghadam and F. P. A. Beik, Modified block AOR iterative method for Z-matrices linear systems, The 40th Annual Iranian Mathematics conference, Sharif University of technology, Tehran (2008).
- F. P. A. Beik and M. M. Moghadam, Note to the preconditioned generalized mixed-type splitting iterative method,, The 42th Annual Iranian Mathematics conference, Vali-e-Asr University of Rafsanjan, Rafsanjan (2011).
- F. P. A. Beik and M. M. Moghadam, Projection methods for solving Sylvester matrix equation, The 42th Annual Iranian Mathematics conference, Vali-e-Asr University of Rafsanjan, Rafsanjan (2011).
- F. P. A. Beik and D.K. Salkuyeh, An iterative algorithm for the generalized (P,Q)-reflexive solution of the coupled Sylvester-transpose matrix equations, The 43rd Annual Iranian Mathematical conference, Tabriz Univerity, Tabriz (2012).
- F. P. A. Beik and D.K. Salkuyeh, On the convergence of the GI-GMRES method for solving the general coupled linear matrix equations, The 43rd Annual Iranian Mathematical conference, Tabriz Univerity, Tabriz (2012).
- F. P. A. Beik, Iterative algorithms for solving coupled Sylvester-transpse matrix equations, The 5th Mathematics conference of Payame Noor University, Shiraz (2012).
- F. P. A. Beik and D. K. Salkuyeh, A projection technique for reflexive (anti-reflexive) solution of the coupled linear matrix equations, The 4th Conference on Mathematical Analysis and its Applications, Khansar (2013).
- D. K. Salkuyeh and F. P. A. Beik, On the convergenc of the gradient-based iterative method, The 44th Annual Iranian Mathematics Conference, Ferdowsi University of Mashhad, (2013).
- F. P. A. Beik, N. N. Shams and S. Ahmadi-Asl, A preconditioned GAOR iterative method for solving linear system of equations, The 7th Seminar on Linear Algebra and its Applications, Mashhad (2014).
- F. P. A. Beik and S. Ahmadi-Asl, Note to the gradient-based iterative algorithm for solving Sylvester tensor equations, The 7th Seminar on Linear Algebra and its Applications, Mashhad (2014).
- F. P. A. Beik and S. Ahmadi-Asl, On the execution and convergence of GMRES-BTF method for solving Sylvester tensor equations, The 45h Annual Iranian Mathematics Conference, Semnan University, (2014).
- D. K. Salkuyeh, M. Hasani and F. P. A. Beik, The best preconditioned AOR method for a class of matrices, The 45th Annual Iranian Mathematics Conference, Semnan University, (2014).
- F. P. A. Beik and F. S. Movahed, FOM-BTF: Full Orthogonalization method based on tensor format, 5th Conference on Mathematical Analysis and its Applications, Vali-e-Asr University, Rafsanjan, (2014).
- F. P. A. Beik, S. Ahmadi-Asl and D. K. Salkuyeh, CGLS for general coupled linear matrix equations over Quaternions,5th Conference on Mathematical Analysis and its Applications, Vali-e-Asr University, Rafsanjan, (2014).
- S. Ahmadi-Asl and F. P. A. Beik, An iterative algorithm for Hermitian tridiagonal least-squares solutions of quaternion matrix equations, The 8th Seminar on Linear Algebra and its Applications, University of Kurdistan, (2015).

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- F. P. A. Beik and M. Benzi, On the block triangular preconditioners for stabilized saddle point problems, The 47th Annual Iranian Mathematics Conference, Kharazmi University, (2016).
- F. P. A. Beik, A. Ameri and S. Ahmadi-Asl, Iterative refinement of the solution of ill-conditioned linear system, The 47th Annual Iranian Mathematics Conference, Kharazmi University, (2016).
- F. P. A. Beik and Mehdi Najafi, A generalized global Arnoldi method based on tensor format for ill-posed tensor equations, the third conference on Numerical Analysis and Scientific Computation with Applications (NASCA2018), Kalamata, Greece, July 2nd–July 6th (2018).
- Mehdi Najafi and F. P. A. Beik, A generalized global Golub-Kahan method for ill-posed matrix equations, The 7th Conference on Mathematical Analysis and its Applications, Shahid Bahonar University of Kerman, Kerman, Iran July 11–12 (2018).
- A. Ameri and F. P. A. Beik, Iterative schemes with delayed over-relaxation step to solve complex matrix equations, The 7th Conference on Mathematical Analysis and its Applications, Shahid Bahonar University of Kerman, Kerman, Iran July 11–12 (2018).

### Supervised Ph.D. Students

- 2013–2016 **Salman Ahmadi-Asl**, *New developments on iterative methods to solve some classes of linear operator equations over quaternion ring*, Advisor: M. M. Moghadam, Defense date: December 16, 2016.
- 2014–2018 **Sayyed-Hasan Azizi Chaparpordi**, *Topics on iterative methods and preconditioned techniques for solving some linear problems*, Advisor: D. K. Salkuyeh, Defense date: September 17, 2018.
- 2014–2019 **Arezo Ameri**, *New developments on iterative methods for solving some linear and murilinear system of equations*, Advisor: H. Sadeghi-Goughery, Defense date: January 24, 2019.
- 2017–present **Mehdi Najafi-Kalyani**, *Topics on numerical techniques related to large matrices with Kronecker structure*, Advisor: K. Jbilou.
- 2018–present **Somayeh Mollahsani**.

### Supervised long-term visitors

- 2014 **Farid Saberi Movahed**, *February–September*.

### Supervised M.Sc. Students

- 2011–2013 **Nafiseh Naseri Shams**, *Mixed-Type splitting iterative method for solving linear system of equations*, Defense date: August 19, 2013, Advisor: Prof. M. M. Moghadam.
- 2012–2014 **Raziyeh Mirzashemi**, *Numerical solutions of matrix differential equations using cubic-matrix splines*, Defense date: September 18, 2014, Advisor: Dr. Z. Rahbani.
- 2012–2014 **Batool Rahmani**, *Preconditioned generalized accelerated overrelaxation iterative methods for solving linear system of equations*, Defense date: September 18, 2014.
- 2012–2014 **Arezo Keshvari-Pour**, *Hermitian and skew-Hermitian splitting (HSS) iterative method for solving linear matrix equations*, Defense date: October 18, 2014.
- 2013–2015 **Shima Adelinia**, *Iterative methods for solving complex symmetric linear systems*, Defense date: August 29, 2015.

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- 2013–2015 **Elham Moradi**, *Matrix iterative methods for constraint solutions of the matrix equations*, Defense date: August 29, 2015.
- 2013–2015 **Mobarakeh Gharavi**, *Numerical solution of matrix equations via conjugate gradient method*, Defense date: September 22, 2015.
- 2014–2016 **Fatemeh Zebardast**, *A class of iterative methods for solving saddle point problem*, Defense date: July 4, 2016.
- 2015–2017 **Zohreh Roygari**, *Successive over relaxation (SOR) iterative method and its symmetric version to solve saddle point problem*, Defense date: September 11, 2017.
- 2015–2018 **Athareh Ghaderi**, *Successive over relaxation (SSOR) iterative method for solving some nonsymmetric linear systems of equations*, Defense date: September 18, 2018.
- 2017–present **Marjan Pourasadolahi**, *Studying the performance of preconditioners extracted from some stationary iterative method for saddle point problems*.
- 2017–present **Sepideh Farokhi**, *A class of stationary iterative methods and its corresponding preconditioner to solve Sylvester matrix equations*.

## Additional Activities

- Reviewer in Mathematical Reviews (MathSciNet)
- Reviewer in Zentralblatt MATH (zbMath)
- Referee for the following journals
  - Bulletin of the Iranian Mathematical Society
  - Mathematical Problem in Engineering
  - Transactions of the Institute of Measurement and Control
  - Iranian Journal of Numerical Analysis and Optimization
  - Computers & Mathematics with Applications
  - IET Control Theory & Applications
  - Journal of Applied Mathematics and Computing
  - Asian Journal of Control
  - Iranian Journal of Science and Technology (Sciences)
  - Mathematical Modelling and Analysis
  - CALCOLO; Wavelet and Linear Algebra; FILOMAT
  - Numerical Algorithms
  - Journal of Inequalities and Applications
  - Applied Mathematics and Computation
  - BIT Numerical Mathematics
  - International Journal of Computer Mathematics
  - IMA Journal of Numerical Analysis
  - SIAM Journal on Matrix Analysis and Applications
  - Linear and Multilinear Algebra; Advances in Mechanical Engineering; Optimization
  - International Journal of Systems Science
  - Applied Mathematics Letters

## Languages

Persian **Mother tongue**

English **Advance**

Fluent

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- 2 **Mohammad Ali Dehghan**, *Department of Mathematics*, Vali-e-Asr University of Rafsanjan, email: dehghan@vru.ac.ir.
- 3 **Mahmoud Mohseni Moghadam**, *Department of Mathematics*, Shahid Bahonar University of Kerman, email: mohseni@uk.ac.ir.
- 4 **Davod Khojasteh Salkuyeh**, *Department of Mathematics*, University of Guilan, email: salkuyeh@gmail.com; khojasteh@guilan.ac.ir.

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