

## CURRICULUM VITAE

### PERSONAL DATA

<b>Name</b>	Mohamed Abdelkawy Abdelhalim Mohamed
<b>Nationality</b>	Egyptian
<b>Position</b>	Associate Professor
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### EDUCATION

<b>Year</b>	<b>Academic Degree</b>	<b>Institution</b>
2014	Ph.D. Degree	Faculty of Science, Beni-Suef University, Egypt
2011	M.Sc. Degree	Faculty of Science, Beni-Suef University, Egypt
2003	B.Sc. Degree	Faculty of Science (Beni-Suef), Cairo University, Egypt,

### WORK EXPERIENCE

<b>Period</b>	<b>Position</b>	<b>Address</b>
10/2019 up to now	Associate Professor	Faculty of Science, Imam Mohammed Ibn- Saud Islamic University, Riyadh, Saudi Arabia
2/2016-10/2019	Assistant Professor	Faculty of Science, Imam Mohammed Ibn- Saud Islamic University, Riyadh, Saudi Arabia
10/2014-2/2016	Assistant Professor	Faculty of Science, Beni-Suef University, Egypt
7/2011-10/2014	Assistant Lecturer	Faculty of Science, Beni-Suef University, Egypt
9/2005-7/2011	Demonstrator	Faculty of Science, Beni-Suef University, Egypt
4/2004-9/2005	Demonstrator	Faculty of Science, Beni-Suef Branch, Cairo University, Egypt

## RESEARCH INTERESTS

- Numerical analysis and scientific computing.
- Spectral methods and their applications.
- Developing spectral methods for solving ordinary/partial functional differential equations.
- Nonlinear partial differential equations.
- Functional differential equations.
- Fractional Differential Equations.
- Variable order fractional differential equations.
- Integral equations.
- Fractional integral equations.
- Fractional integro-differential equations.
- Variable order fractional integro-differential equations.
- Distributed order fractional differential equations.
- Complex partial differential equations.
- Error and convergence analysis.
- Orthogonal polynomials.
- Exact solutions of nonlinear partial differential equations that describe nonlinear phenomena appear in many scientific and engineering fields.

## PUBLICATIONS

ائمة بمجمل الإنتاج العلمى والمؤلفات العلمىة:

كتب

- 1) A.H. Bhrawy, T.M. Taha, **M. A. Abdelkawy**, R.M. Hafez, On numerical methods for fractional differential equation on a semi-infinite interval, A Book chapter.
- 2) E. H. Doha, M. A. Zaky, **M. A. Abdelkawy**, Applications in Engineering,

Life and Social Sciences; Spectral methods within fractional calculus, Walter de Gruyter GmbH & Co KG (2019).

- 3) Mahmoud A. Zaky, **Mohamed A. Abdelkawy**, Samer S. Ezz-Eldien, and Eid H. Doha, Fractional-Order Modeling of Dynamic Systems with Applications in Optimization, Signal Processing, and Control, 1st Edition, Pseudo spectral methods for the Riesz space-fractional Schrödinger equation, Book chapter.

#### لأبحاث العلمية

- 1) **M. A. Abdelkawy**, E M Soluma, A. H. Tedjani<sup>1</sup> and E. Hassan, Spectral collocation technique for solving fractional generalized Cattaneo model, Accepted (2023)
- 2) AE Matouk, TN Abdelhameed, DK Almutairi, **MA Abdelkawy**, MAE Herzallah, Existence of Self-Excited and Hidden Attractors in the Modified Autonomous Van der Pol-Duffing Systems, Mathematics 11 (3), (2023) 591.
- 3) EM Soluma, **MA Abdelkawy**, Family of ruled surfaces generated by equiform Bishop spherical image in Minkowski 3-space, AIMS Mathematics 8 (2), (2023) 4372-4389.
- 4) **MA Abdelkawy**, EM Soluma, I Al-Dayel, D Baleanu, Spectral solutions for a class of nonlinear wave equations with Riesz fractional based on Legendre collocation technique, Journal of Computational and Applied Mathematics 423, (2023) 114970.
- 5) AZ Amin, **MA Abdelkawy**, I Hashim, A space-time spectral approximation for solving nonlinear variable-order fractional convection-diffusion equations with nonsmooth solutions, International Journal of Modern Physics C (IJMPC) 34 (03), (2023) 1-14
- 6) **MA Abdelkawy**, AM Lopes, Spectral Solutions for Fractional Black-Scholes Equations, Mathematical Problems in Engineering 2022, 9365292.
- 7) Dina Mostafa, Mahmoud A Zaky, Ramy M Hafez, Ahmed S Hendy, **Mohamed A Abdelkawy**, Ahmed A Aldraiweesh, Tanh Jacobi spectral

- collocation method for the numerical simulation of nonlinear Schrödinger equations on unbounded domain, *Mathematical Methods in the Applied Sciences*, *Mathematical Methods in the Applied Sciences* 46 (1), (2023) 656-674.
- 8) O Algahtani, **MA Abdelkawy**, AM Lopes, A pseudo-spectral scheme for variable order fractional stochastic Volterra integro-differential equations, *AIMS Mathematics* 7 (8), (2022) 15453-15470.
- 9) **MA Abdelkawy**, MB Jeelani, AS Alnahdi, TM Taha, EM Soluma, Legendre spectral collocation method for distributed and Riesz fractional convection–diffusion and Schrödinger-type equation, *Boundary Value Problems* 2022 (1), 1-15.
- 10) Zulqurnain Sabir, Maham Munawar, **Mohamed A Abdelkawy**, Muhammad Asif Zahoor Raja, Canan Ünlü, Mdi Begum Jeelani, Abeer S Alnahdi, Numerical Investigations of the Fractional-Order Mathematical Model Underlying Immune-Chemotherapeutic Treatment for Breast Cancer Using the Neural Networks, *Fractal and Fractional* 6 (4), (2022) 184
- 11) **M A Abdelkawy**, AZM Amin, AM Lopes, I Hashim, MM Babatin, Shifted Fractional-Order Jacobi Collocation Method for Solving Variable-Order Fractional Integro-Differential Equation with Weakly Singular Kernel, *Fractal and Fractional* 6 (1), (2021) 19.
- 12) MM Al-Shomrani, **M A Abdelkawy**, Legendre Spectral Collocation Technique for Advection Dispersion Equations Included Riesz Fractional, *Fractal and Fractional* 6 (1), (2022) 9.
- 13) **MA Abdelkawy**, MEA Zaky, MM Babatin, AS Alnahdi, Jacobi spectral collocation technique for fractional inverse parabolic problem, *Alexandria Engineering Journal* 61 (8), (2022) 6221-6236
- 14) **M. A. Abdelkawy**, A. Z. M. Amin & António M. Lopes, Fractional-order shifted Legendre collocation method for solving non-linear variable-order fractional Fredholm integro-differential equations, *Comp. Appl. Math.* 41, 2 (2022).

- 15) Z Sabir, MAZ Raja, AS Alnahdi, MB Jeelani, **M. A. Abdelkawy**, Numerical investigations of the nonlinear smoke model using the Gudermannian neural networks, *Mathematical Biosciences and Engineering* 19 (1), (2022) 351-370.
- 16) Mdi Begum Jeelani, Abeer S Alnahdi, Mohammed A Almalahi, Mohammed S Abdo, Hanan A Wahash, **M. A. Abdelkawy**, Study of the Atangana-Baleanu-Caputo type fractional system with a generalized Mittag-Leffler kernel, *AIMS Mathematics* 7 (2), (2022) 2001-2018.
- 17) **M. A. Abdelkawy** and Mohamed M. Al-Shomrani, Spectral Solutions for Diffusion Equations of Riesz Distributed-Order Space-Fractional, *Alexandria Engineering Journal*, 61(2), (2022) 1045-1054
- 18) **M. A. Abdelkawy**, M. M. Babatin, A. S. Alnahdi, T. M. Taha, Legendre spectral collocation technique for fractional inverse heat conduction problem, *International Journal of Modern Physics C*, 2250065.
- 19) **M. A. Abdelkawy**, AZM Amin, MM Babatin, AS Alnahdi, MA Zaky, RM Hafez, Jacobi Spectral Collocation Technique for Time-Fractional Inverse Heat Equations, *Fractal and Fractional* 5 (3), 115
- 20) **M.A. Abdelkawy**, S.S. Ezz-Eldien, Anjan Biswas, Abdullah Kamis Alzahrani, Milivoj R. Belic, Optical Solitons for Chen–Lee–Liu Equation with Two Spectral Collocation Approaches, *Computational Mathematics and Mathematical Physics* 61 (9), 1432-1443.
- 21) E. H. Doha, **M. A. Abdelkawy**, A. Z. M. Amin and António M. Lopes, Numerical solutions for variable-order fractional Gross–Pitaevskii equation with two spectral collocation approaches, *International Journal of Nonlinear Sciences and Numerical Simulation*, <https://doi.org/10.1515/ijnsns-2021-0018>.
- 22) **M. A. Abdelkawy**, Salem Alyami, Legendre-Chebyshev spectral collocation method for two-dimensional nonlinear reaction-diffusion equation with Riesz space-fractional, *Chaos, Solitons & Fractals*, **151**, 111279.
- 23) **MA Abdelkawy**, Shifted Legendre spectral collocation technique for

- solving stochastic Volterra–Fredholm integral equations, International Journal of Nonlinear Sciences and Numerical Simulation, <https://doi.org/10.1515/ijnsns-2020-0144>
- 24) **M. A. Abdelkawy**, Numerical T Numerical Technique for Solving for Solving Fractional-order of IVGTT Glucose-insulin Interaction, Applications and Applied Mathematics: An International Journal (AAM), **16** (2021) 739-751.
- 25) **M. A. Abdelkawy**, Salem Alyami, A Spectral Collocation Technique for Riesz Fractional Chen-Lee-Liu Equation, Journal of Function Spaces, **2021**, Article ID 5567970, 9pp, doi.org/10.1155/2021/5567970.
- 26) **M. A. Abdelkawy**, Numerical solutions for fractional initial value problems of distributed-order, International Journal of Modern Physics C (IJMPC), **32**(07), (2021) 1-13.
- 27) E. H. Doha, **M. A. Abdelkawy**, A. Z. M. Amin, António M. Lopes, Shifted fractional Legendre spectral collocation technique for solving fractional stochastic Volterra integro-differential equations, Engineering with Computers, (2021) <https://doi.org/10.1007/s00366-020-01263-w>.
- 28) **M. A. Abdelkawy**, E. E. Mahmoud, K. M. Abualnaja, A. Abdel-Aty, Sunil Kumar, Accurate spectral algorithm for two-dimensional variable-order fractional percolation equations, Mathematical Methods in the Applied Sciences, (2021) <https://doi.org/10.1002/mma.7195>
- 29) **M. A. Abdelkawy**, Zulqurnain Sabir, Juan L.G. Guirao, Tareq Saeed, Numerical investigations for solving a new nonlinear singular second order coupled functional differential model of Lane-Emden type, Open Physics, **18** (2020) 770–778.
- 30) M.M. Al-Shomrani and **M.A. Abdelkawy**, Numerical simulation for fractional-order differential system of a Glioblastoma Multiforme and Immune system, Advances in Difference Equations, (2020) 2020:516 <https://doi.org/10.1186/s13662-020-02978-2>.
- 31) S. S. Ezz-Eldien . Y. Wang . **M. A. Abdelkawy** . M. A. Zaky . A. A. Aldraiweesh J. Tenreiro Machado, Chebyshev spectral methods for

- multi-order fractional neutral pantograph equations, *Nonlinear Dyn.* 100, (2020) 3785–3797
- 32) Rubayyi T. Alqahtani and **M. A. Abdelkawy**, An efficient numerical algorithm for solving fractional SIRC model with salmonella bacterial infection, *Mathematical Biosciences and Engineering*, 17(4): 3784–3793.
- 33) **M. A. Abdelkawy**, A. M. Lopes, Mohammed M. Babatin, Shifted fractional Jacobi collocation method for solving fractional functional differential equations of variable order, *Chaos, Solitons & Fractals.*, 134, (2020) 109721.
- 34) **M.A. Abdelkawy**, An improved collocation technique for distributed-order fractional partial differential equations, *Rom. Rep. Phys*, In Press, Vol. 72 No. 1 (2020).
- 35) **M. A. Abdelkawy**, Mohammed M. Babatin, A. M. Lopes, Highly accurate technique for solving distributed-order time-fractional-sub-diffusion equations of fourth order, *Computational & Applied Mathematics*, (2020) 39:65.
- 36) Ramy M. Hafez , Mahmoud A. Zaky and **Mohamed A. Abdelkawy**, Jacobi Spectral Galerkin method for Distributed-Order Fractional Rayleigh-Stokes problem for a Generalized Second Grade Fluid, *Frontiers in Physics*, In Press. <https://doi.org/10.3389/fphy.2019.00240>.
- 37) **M. A. Abdelkawy**, Accurate spectral algorithms for solving variable-order fractional percolation equations, *Applications and Applied Mathematics: An International Journal (AAM)*, Accepted.
- 38) **M. A. Abdelkawy** and Ibrahim G. Ameen, A Spectral Collocation Method for Coupled System of Two Dimensional Abel Integral Equations of the Second Kind, *Inf. Sci. Lett.* 8, No. 3, 89-93 (2019) 89
- 39) **M.A. Abdelkawy**, Antonio M. Lopes and M. A. Zaky, Shifted fractional Jacobi spectral algorithm for solving distributed order time-fractional reaction-diffusion equations, *Computational & Applied Mathematics*, (2019) 38:81.
- 40) E. H. Doha, **M. A. Abdelkawy**, Ahmed Z.M. Amin, Dumitru Baleanu,

- Approximate solutions for solving nonlinear variable-order fractional Riccati differential equations, *Nonlinear Analysis: Modelling and Control*, (2019) 24(2) 176–188
- 41) E. Doha, **M. A. Abdelkawy**, D. Baleanu, A. Amin, Shifted Jacobi spectral collocation method with convergence analysis for Volterra and mixed Volterra-Fredholm integral equations, *Nonlinear Analysis: Modelling and Control*, (2019) 24 (3), 332-352.
- 42) E. H. Doh, **M. A. Abdelkawy**, A. Z. M. Amin, A. M. Lopes, Shifted Jacobi-Gauss-collocation with convergence analysis for fractional integro-differential equations  
*Communications in Nonlinear Science and Numerical Simulation*, 2019, [72](#)(30) , 342-359.
- 43) **M. A. Abdelkawy**, A collocation method based on Jacobi and fractional order Jacobi basis functions for multi-dimensional distributed-order diffusion equations, *International Journal of Nonlinear Sciences and Numerical Simulation*, (2018) 19(7-8), 781-792.
- 44) E. H. Doha, **M. A. Abdelkawy**, A. Z. M. Amin, António M. Lopes, A space–time spectral approximation for solving nonlinear variable-order fractional sine and Klein–Gordon differential equations, *Computational & Applied Mathematics*, (2018) 37 (5), 6212-6229.
- 45) **M. A. Abdelkawy**, O. H. El-Kalaawy, R. B. Al-Denari, Anjan Bisaws, Application of fractional sub-equation method to nonlinear evolution equations, *Nonlinear Analysis: Modelling and Control*, (2018) 23 (5), 710-723.
- 46) A.A. El-Kalaawy, E.H. Doha, S.S. Ezz-Eldien, **M.A. Abdelkawy**, R.M. Hafez, A.Z.M. Amin, D. Baleanu, M.A. Zaky, A computationally efficient method for a class of fractional variational and optimal control problems using fractional Gegenbauer functions, *Romanian Reports on Physics*, 70, 109 (2018).
- 47) E. H. Doha, **M. A. Abdelkawy**, A. Z. M. Amin, António M. Lopes, On spectral methods for solving variable-order fractional integro-



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- 49) E. H. Doha, **M. A. Abdelkawy**, A Z M Amin, D. Baleanu, Spectral technique for solving variable-order fractional Volterra integro-differential equations, Numerical Methods for Partial Differential Equations, DOI: 10.1002/num.22233.
- 50) Anjan Biswas, Rubayyi T Alqahtani, **M. A. Abdelkawy**, Optical soliton perturbation with parabolic and dual-power law nonlinearities by semi-inverse variational principle, Optik 147 (2017) 82–87.
- 51) E. H. Doha, R. M. Hafez, **M. A. Abdelkawy**, S.S. Ezz-Eldien, T. M. Taha, M.A. Zaky, A.Z.M. Amin, A.A. El-Kalaawy, D. Baleanu, Composite Bernoulli-Laguerre Collocation method for a class of hyperbolic Telegraph type equations, Romanian Reports on Physics, 69, 119 (2017).
- 52) M. A. Zaky, I. G. Ameen, **M. A. Abdelkawy**, A new operational matrix based on Jacobi wavelets for a class of variable-order fractional differential equations, Proceedings of The Romanian Academy, Series A, 18 (2017) 315–322.
- 53) S. S. Ezz-Eldien, E. H. Doha, A. H. Bhrawy, **M. A. Abdelkawy**, D. Baleanu, Solving Fractional Optimal Control Problems within a Chebyshev-Legendre Operational Technique, **International Journal of Control**, 90 (2017) 1230-1244.
- 54) **M. A. Abdelkawy**, Rubayyi T. Alqahtani, Shifted Jacobi spectral collocation method for solving two-sided fractional water wave models, Eur. Phys. J. Plus (2017) 132: 50
- 55) **M. A. Abdelkawy**, E. H. Doha, A. H. Bhrawy, A. Z. A. Amin, Efficient pseudospectral scheme for 3D integral equations, Proc. Romanian Acad. A, 18 (2017) 199–206.

- 56) **M. A. Abdelkawy**, Rubayyi T. Alqahtani, Space-time spectral collocation algorithm for the variable-order Galilei invariant advection diffusion equations with a nonlinear source term, *Mathematical Modelling and Analysis*, **22**(1), (2017) 1-20.
- 57) **M. A. Abdelkawy**, A. Z. M. Amin, A. H. Bhrawy, J. A. Tenreiro Machado and A. M. Lopes, Jacobi Collocation Approximation for Solving Multi-dimensional Volterra Integral Equations, *International Journal of Nonlinear Sciences and Numerical Simulation*, **18** (2017)  
DOI: <https://doi.org/10.1515/ijnsns-2016-0160>
- 58) **M. A Abdelkawy**, Rubayyi T. Alqahtani, Shifted Jacobi collocation method for solving multi-dimensional fractional Stokes' first problem for a heated generalized second grade fluid, *Advances in Difference Equations* (2016) 2016:114 DOI: 10.1186/s13662-016-0845-z.
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[dx.doi.org/10.1142/S0219876216500365](https://doi.org/10.1142/S0219876216500365).
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- 66) A.H. Bhrawy, E.H. Doha, **M.A. Abdelkawy**, R.A. Van Gorder, Jacobi–Gauss–Lobatto collocation method for solving nonlinear reaction–diffusion equations subject to Dirichlet boundary conditions, *Applied Mathematical Modelling*, 40 (2016) 1703–1716.
- 67) A. H. Bhrawy, E. H. Doha, S. S. Ezz-Eldien, **M. A. Abdelkawy**, A numerical technique based on the shifted Legendre polynomials for solving the time-fractional coupled KdV equation, *Calcolo*, 53 (2016) 1–17.
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- with non-local boundary conditions, *J. Comput. Nonlin. Dyn.* 10 (2015) 021016-13.
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- 74) **M. A. Abdelkawy**, M. A. Zaky, A. H. Bhrawy, D. Baleanu, Numerical simulation of time variable fractional order mobile-immobile advection-dispersion model, *Rom. Rep. Phys.*, 67 (2015) 773–791.
- 75) A. H. Bhrawy, E. H. Doha, **M. A. Abdelkawy**, R. M. Hafez, An efficient collocation algorithm for multidimensional wave type equations with nonlocal conservation conditions, *Appl. Math. Model.*, 39 (18) (2015) 5616–5635.
- 76) **M. A. Abdelkawy**, E. A. Ahmed and P. Sanchez, A method based on Legendre pseudo-spectral approximations for solving inverse problems of parabolic types equations, *Math. Sci. Lett.*, 4 (2015) 81-90.
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