

CURRICULUM VITAE

Iqbal M. Batiha

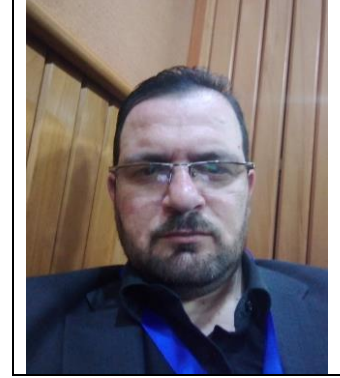
*Department of Mathematics,
Faculty of Science and Technology,
Al Zaytoonah University of Jordan,
Amman, Jordan*

Phone: +962 786 500389

Fax: +962 6 4291432

E-mail: i.batiha@zuj.edu.jo

Homepage: <https://www.researchgate.net/profile/Iqbal-Batiha>



1. Personal Data

Place of Birth: Irbid, Jordan.

Nationality: Jordanian.

2. Education

- Ph.D. (Applied Mathematics) 2019, The University of Jordan, Amman, Jordan
- M.Sc. (Applied Mathematics) 2014, AL-abayt University, Mafraq, Jordan
- High Diploma (Information Technology and Communication) 2009, Al-Yarmouk University, Irbid, Jordan
- B.Sc. (Applied Mathematics) 2002, Jordan University of Science and Technology, Irbid, Jordan

3. Ph.D. Dissertation

Tuning of Fractional-order $PI\lambda D\delta$ Controllers using Particle Swarm Optimization Technique, The University of Jordan, Amman, Jordan.



4. Employment

Academic Positions

- Assistant Professor, Department of Mathematics, Al Zaytoonah University of Jordan, Amman, Jordan, October 2, 2022 – now.
- Assistant Professor, Department of Mathematics, Irbid National University, Irbid, Jordan, February 20, 2021 – October 1, 2022.
- Adjunct Research Associate Professor, Nonlinear Dynamics Research Center, Ajman University, Ajman, UAE, February 20, 2021 – now.
- Research Associate, Al-Balqa Applied University, Irbid, Jordan, March 16, 2022– February 15, 2023.
- Research Associate and Statistical Analyst, Al-Zaytoonah University of Jordan, Amman, Jordan, June 30, 2022 – October 1, 2022.
- Research Assistant, Ajman University, Ajman, UAE, May 1, 2020 – December 1, 2020.
- Part Time Instructor, Department of Mathematics, The University of Jordan, Amman, Jordan, June 10, 2019 – August 20, 2019.
- Part Time Instructor, Department of Mathematics, Irbid National University, Irbid, Jordan, June 10, 2014 – August 20, 2014.

Administrative Positions

- Chairman of Mathematics Department, Irbid National University, Irbid, Jordan, 9/2022 - 10/2022.

5. Research Interests

- **Fractional Calculus:** Fractional differential equations, Fractional difference equations.
- **Control Theory:** Fractional-order PID-controller, PID-controller.
- **Mathematical Modelling:** Hopfield neural network models, COVID-19 models, Stability analysis.
- **Optimization Techniques:** Particle swarm optimization algorithm, Bacterial foraging optimization algorithm.
- **Chaos:** Hidden chaotic attractors, Coexisting attractors, Synchronization, Chaotic behavior analysis.
- **Numerical Methods:** Finite difference method, Adomian decomposition method, Fractional Euler method, Optimal homotopy analysis method, Optimal homotopy asymptotic method.

6. Membership in Scientific Societies and Associations

- Member in Mathematical Reviews Database: American Mathematical Society (AMS).

7. Honors and Awards



- Oliviu Gherman Award: In Testimony of the High Regard of my Achievements in the Area of Fractional Calculus and its Applications. The First Online Conference on Modern Fractional Calculus and Its Applications. Biruni University, Istanbul, Turkey, December 4-6, 2020.
- Riemann-Liouville Award, Best FDA Papers: International Conference on Fractional Differentiation and its Applications (ICFDA'18), Amman, Jordan, 16-18 July, 2018.
- The 5th position in Competition for Poetry: Literature Sawaleef Competition, Amman, Jordan, 2018.
- The 4th position in Competition for Poetry: Cultural Bsaira Ceremony, Tafilah, Jordan, 2006.
- First class honors in Master Degree: AL-Albayt University, Mafrq, Jordan, 2014.
- The University of Hail Friends' List: Hail, Saudi Arabia, 2022.
- Outstanding Reviewer: International Journal of Emerging Multidisciplinary-Mathematics (IJEMD-M), Volume 1, Issue 1 (inaugural issue), 2022.

8. Fellowships and Scholarships

9. Teaching Experience

- *Graduate Courses*

Calculus I, Calculus II, Statistics and Probability I, Statistics and Probability II, Discrete Mathematics, Number Theory, Numerical Analysis I, Differential Equations I Biostatistics, Numerical Analysis II.

- *Undergraduate Courses*

10. Supervision of Graduate Research

1. Ahamad Obeidat, A Mathematical Study on a Fractional-order COVID-19 Model, Irbid National University, Irbid, Jordan, 2021.
2. Suhaib Njadat, Tuning Fractional-order PID Controller for Single-Joint Arm Dynamics, Irbid National University, Irbid, Jordan, 2021.
3. Nashat Alamarat, Solving 2×2 -System of Linear Homogeneous Incommensurate Fractional-order Differential Equations, Irbid National University, Irbid, Jordan, 2022.
4. Omar Talafha, Solving Fractional Higher-order Linear Time Invariant Systems Using Adomian Decomposition Method, Irbid National University, Irbid, Jordan, 2022.
5. Hamzeh Kana'an, A Numerical Modification of Fractional Euler Method, Irbid National University, Irbid, Jordan, 2022.
6. Ahmad Jarrah, A Numerical Scheme for Solving Fractional-order Differential Equations, Irbid National University, Irbid, Jordan, 2022.



11. Grants

1. The effectiveness of the application of participatory research to raise the level of classification of Al-Zaytoonah University of Jordan globally, June 22, 2022 - October 1, 2022, Al-Zaytoonah University of Jordan.
2. Chaos, Control and Synchronization in Fractional Dynamical Systems and Reaction-Diffusion Systems), March 16, 2022 - March 15, 2023, Al-Balqa Applied University.
3. Mathematical Modeling of the Pandemic Coronavirus (COVID-19) Outbreak through Fractional Derivatives, May 1, 2020 – December 1, 2020, Ajman University and Microsoft Corporation.

12. Patents

13. Membership of Committees

- **National and International**
 - *Technical Program Committee (TPC) member: The 11th International Conference on Information Technology (ICIT 2023), 14-15 July 2023, AlZaytoonah University, Amman, Jordan.*
 - *International Scientific Committee member: The International Conference on Fractional Differentiation and its Applications (ICFDA 2022), 14-16 March 2023, Ajman University, Ajman, UAE.*
 - *National Scientific Committee: The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), 11-13 May 2022, Zarqa University, Zarqa, Jordan.*
 - *Technical Program Committee (TPC) member: The 2021 Global Congress on Electrical Engineering (GC-ElecEng 2021), 10-11 December 2021 (Remotely), Valencia, Spain.*
 - *Technical Program Committee (TPC) member: International Conference on Electrical, Computer and Energy Technologies (ICECET'21), 09-10 December 2021, Cape Town, South Africa.*
 - *Member of Scientific Committee: IEEE International Conference on Recent Advances in Mathematics and Informatics (ICRAMI'2021), 21-22 Sep. 2021, University of Tebessa, Algeria.*
 - *Technical Program Committee (TPC) member: The 10th International Conference on Information Technology (ICIT 2021), 14-15 July 2021, AlZaytoonah University, Amman, Jordan.*
- **University**
 - *Member of University Council Committee, Irbid National University, Irbid, Jordan, 2/2021 - 10/2022.*
 - *Member of Student Disciplinary Committee, Irbid National University, Irbid, Jordan, 2/2021 - 10/2022.*



14. Professional and Scientific Meetings

- The International Conference on Fractional Differentiation and its Applications (ICFDA 2022), 14-16 March (2023), Ajman University, Ajman, UAE.
- The Sixth International Conference on Computational Mathematics and Engineering Sciences (CMES-2022), 20-22 May (2022), Ordu, Turkey.
- Second International Workshop Numerical Solution of Fractional Differential Equations and Applications (NSFDE&A'22), 5-10 June (2022), Sozopol, Bulgaria.
- The 48th International Conference Applications of Mathematics in Engineering and Economics (AMEE), 7-13 June (2022), Technical University of Sofia, Bulgaria.
- The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), 10-12 May (2022), Zarqa University, Jordan.
- Modern Mathematical Methods and High-Performance Computing in Science & Engineering (MMHPC 2021), 23-24 November (2021), Charotar University of Science and Technology (CHARUSAT), India.
- International Symposium on Recent Advances in Fractional Calculus, 30th September-1th October (2021), Charotar University of Science and Technology (CHARUSAT), India.
- The 19th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2021), September 20-26 (2021), Rhodes, Greece.
- The 10th International Conference on Information Technology (ICIT 2021), July 14-15, (2021), AlZaytoonah University, Amman, Jordan.
- The Arab Universities and their Role in Facing the Challenges of the Corona Pandemic–Researches and Awareness Efforts, held virtually by AArU, June 7, (2021).
- The First Online Conference on Modern Fractional Calculus and Its Applications. December 4-6 (2020), Biruni University, Istanbul, Turkey.
- The 3rd International Conference on Signal Processing and Information Security (ICSPIS 2020). Virtual Conference, November 25-26 (2020), University of Dubai, UAE.
- IEEE International Symposium on Signal Processing and Information Technology (IEEE ISSPIT). December 10-12 (2019), Ajman, United Arab Emirates.
- The 45th International Conference Applications of Mathematics in Engineering and Economics (AMEE 2019). June 7-13 (2019), Sozopol, Bulgaria.
- International Conference on Fractional Differentiation and its Applications (ICFDA'18). July 16-18 (2018), Amman, Jordan.

15. Participation in or organization of curricular and/or extra-curricular activities



- *Invited Speaker: The International Conference on Fractional Differentiation and its Applications (ICFDA 2022), 14-16 March 2023, Ajman University, Ajman, UAE.*
- *Session Chair: Track Mathematical Modeling and Analysis (MM&A), The 10th International Conference on Information Technology (ICIT 2021), 14-15 July 2021, AlZaytoonah University, Amman, Jordan.*
- *Lead Guest Editor: A Special Issue of International Journal of Science, Technology and Society (Recent Advances in Fractional-order Discrete/Continuous Systems), 2022, ISSN: 2330-7420.*
- *Editorial Board: International Journal of Emerging Multidisciplinaries Mathematics (IJEMDM), ISSN: 2790-3257, 2022.*
- *Editorial Board: International Journal of Open Problems in Computer Science and Mathematics (IJOPCM), ISSN: 1998-6262.*

Publications

1. Mohamed Mellah, Adel Ouannas, **Iqbal M. Batiha**, *A general method for stabilizing the fractional-order discrete neural networks via linear control law*, Nonlinear Studies, (Accepted).
2. **Iqbal M. Batiha**, Nashat Alamarat, Shameseddin Alshorm, O. Y. Ababneh, Shaher Momani, *Semi-analytical solution to a coupled linear incommensurate system of fractional differential equations*, Nonlinear Functional Analysis and Applications, (Accepted).
3. **Iqbal M. Batiha**, Ahmad Obeidat, Shamseddin Alshorman, Hadi Jahanshahi, Shaher Momani, Meaad Albdareen, *A numerical confirmation of a fractional-order COVID-19 model's efficiency*, Fractals, (Accepted).
4. Zainouba Chebana, Taki-Eddine Oussaeif, Adel Ouannas, **Iqbal M. Batiha**, Sofiane Dehilis, Shaher Momani, *Weak solution, blow-up and numerical study of a nonlinear reaction diffusion problem with an integral condition*, Nonlinear Dynamics and Systems Theory, (Accepted).
5. **Iqbal M. Batiha**, Zainouba Chebana, Taki-Eddine Oussaeif, Adel Ouannas, Shamseddin Alshorman, Amjed Zraiqat, *Solvability and Dynamics of Superlinear Reaction Diffusion Problem with Integral Condition*, IAENG International Journal of Applied Mathematics, (Accepted).
6. **Iqbal M. Batiha**, Leila Ben Aoua, Taki-Eddine Oussaeif, Adel Ouannas, Iqbal H. Jebri, Shamseddin Alshorman, Shaher Momani, *Common fixed point theorem in non-Archimedean Menger PM-spaces using CLR property with application to functional equations*, IAENG International Journal of Applied Mathematics, (Accepted).
7. **Iqbal M. Batiha**, Iqbal H. Jebri, Abeer A. Al-Nana, Adel Ouannas, Shaher Momani, *An Applicable Condition for Assessing the Stability of Linear Fractional Differential Systems*, 6th-International Conference on Computational Mathematics and Engineering Sciences, Ordu, Turkey, 20-22 May 2022, (Accepted).
8. Shaher Momani, **Iqbal M. Batiha**, *A Mathematical study on a fractional-order COVID-19 model*, The 48th International Conference Applications of



- Mathematics in Engineering and Economics (AMEE), Technical University of Sofia, Bulgaria, 7-13 June 2022, (Accepted).
9. Taki-Eddine Oussaeif, Adel Ouannas, **Iqbal M. Batiha**, Antara Benaoua, Hadi Jahanshahi, Janat A. Emwas, *Existence and uniqueness of a weak solution for a semilinear fractional-order parabolic problem with Dirichlet boundary conditions*, Fractals. (IF: 4.555), (Accepted).
 10. Taki-Eddine Oussaeif, Adel Ouannas, **Iqbal M. Batiha**, Leila Ben Aoua, Hadi Jahanshahi, *Priori estimates for a weak solution of a nonlinear fractional reaction-diffusion equation with integral condition*, Fractals. (IF: 4.555), (Accepted).
 11. **Iqbal M. Batiha**, Nouredine Djenina, Adel Ouannas, Taki-Eddine Oussaeif, *Fractional-order SEIR Covid-19 model: Discretization and stability analysis*, The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), Zarqa University, Jordan, 10-12 May 2022, (Accepted).
 12. Jamal Oudetallah, Zainouba Chebana, Taki-Eddine Oussaeif, Adel Ouannas, **Iqbal M. Batiha**, *Theoretical study of explosion phenomena for a semi parabolic problem*, The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), Zarqa University, Jordan, 10-12 May 2022, (Accepted).
 13. Nidal Anakira, Amel Hioual, Adel Ouannas, Taki-Eddine Oussaeif, **Iqbal M. Batiha**, *Global asymptotic stability for discrete-time SEI reaction-diffusion model*, The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), Zarqa University, Jordan, 10-12 May 2022, (Accepted).
 14. Ramzi B. Albadarneh, Ahmad M. Adawi, Sa'ud Al-Sa'di, **Iqbal M. Batiha**, Shaher Momani, *A pro rata definition of the fractional-order derivative*, The 7th International Arab Conference on Mathematics and Computations (IACMC 2022), Zarqa University, Jordan, 10-12 May 2022, (Accepted).
 15. **Iqbal M. Batiha**, Nouredine Djenina, Adel Ouannas, *A stabilization of linear incommensurate fractional-order difference systems*, 19th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2021), Rhodes, Greece, 20-26 Sep. 2021, (Accepted).
 16. Ramzi B. Albadarneh, Amel Hioual, Adel Ouannas, **Iqbal M. Batiha**, *On chaos in the fractional order discrete-time macroeconomic systems*, 19th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2021), Rhodes, Greece, 20-26 Sep. 2021, (Accepted).
 17. Amina Aicha Khenouaoui, Adel Ouannas, **Iqbal M. Batiha**, Viet-Thanh Pham. *Hidden Chaotic Attractors in Fractional Order Discrete Time Systems*. In: Agarwal P., Balas V.E., Baleanu D. (eds) Fractional Order Systems and Applications in Engineering, Springer, (2021), (Chapter in the Book), (Accepted).
 18. **Iqbal M. Batiha**, Reyad El-Khazali, Osama Y. Ababneh, Adel Ouannas, Radwan M. Batyha, Shaher Momani, *Optimal Design of PI^pD^q Controller for Artificial Ventilation Systems for COVID-19 Patients*, AIMS Mathematics. , Vol. 8(1), 657–675, (2022).



19. **Iqbal M. Batiha**, Zainouba Chebana, Taki-Eddine Oussaeif, Aliaa Burqan, Adel Ouannas, Iqbal H. Jebril, *On a Weak Solution of a Fractional-order Temporal Equation*, Mathematics and Statistics, Vol. 10(5), pp. 1116-1120, (2022).
20. **Iqbal M. Batiha**, Shameseddin Alshorm, Adel Ouannas, Shaher Momani, Osama Y. Ababneh, Meaad Albdareen, *Modified Three-Point Fractional Formulas with Richardson Extrapolation*, Mathematics, Vol. 10(19), 3489, (2022).
21. Nidal Anakira, Zinouba Chebana, Taki-Eddine Oussaeif, **Iqbal M. Batiha**, Adel Ouannas, *A study of a weak solution of a diffusion problem for a temporal fractional differential equation*, Nonlinear Functional Analysis and Applications, Vol. 27(3), 679-689, (2022).
22. Amer Dababneh, Nouredine Djenina, Adel Ouannas, Giuseppe Grassi, **Iqbal M Batiha**, Iqbal H Jebril. *A New Incommensurate Fractional-Order Discrete COVID-19 Model with Vaccinated Individuals Compartment*, Fractal and Fractional, Vol. 6(8), 456, (2022).
23. **Iqbal M. Batiha**, Suhaib A. Njadat, Radwan M. Batyha, Amjed Zraiqat, Amer Dababneh, Shaher Momani, *Design Fractional-order PID Controllers for Single-Joint Robot Arm Model*, International Journal of Advances in Soft Computing and its Applications, Vol. 14(2), pp. 96-114, (2022).
24. **Iqbal M. Batiha**, Adel Ouannas, Ramzi Albadarneh, Abeer A. Al-Nana, Shaher Momani, *Existence and Uniqueness of Solutions for Generalized Sturm-Liouville and Langevin equations via Caputo-Hadamard fractional-order Operator*, Engineering Computations, Vol. 39(7), pp. 2581-2603, (2022).
25. Iqbal H. Jebril, **Iqbal M. Batiha**, *On the Stability of commensurate Fractional-order Lorenz System*. Progress in Fractional Differentiation and Applications, Vol. 8(3), 401-407, (2022).
26. Shaher Momani, **Iqbal M. Batiha**. *Tuning of the Fractional-order PID Controller for some Real-life Industrial Processes using Particle Swarm Optimization*, Progress in Fractional Differentiation and Applications, Vol. 8(3), 377-391, (2022).
27. Nouredine Djenina, Adel Ouannas, **Iqbal M. Batiha**, Giuseppe Grassi, Taki-Eddine Oussaeif, Shaher Momani, *A Novel Fractional-Order Discrete SIR Model for Predicting COVID-19 Behavior*, Mathematics, Vol. 10(13), 2224, (2022).
28. **Iqbal M. Batiha**, Abeer A. Al-Nana, Ramzi B. Albadarneh, Adel Ouannas, Ahmad Al-Khasawneh, Shaher Momani, *Fractional-order coronavirus models with vaccination strategies impacted on Saudi Arabia's infections*, AIMS Mathematics, Vol. 7(7), 12842–12858, (2022).
29. Amel Hioual, Taki-Eddine Oussaeif, Adel Ouannas, Giuseppe Grassi, **Iqbal M. Batiha**, Shaher Momani, *New results for the stability of fractional-order discrete-time neural networks*, Alexandria Engineering Journal, Vol. 61(12), 10359-10369, (2022).
30. Ma'mon Abu Hammad, Iqbal H. Jebril, **Iqbal M. Batiha**, Salemah Almutlak. *Fractional Frobenius Series Solutions of Confluent α*



- Hypergeometric Differential Equation*. Progress in Fractional Differentiation and Applications, Vol. 8(2), 297-304, (2022).
31. Taki-Eddine Oussaeif, Adel Ouannas, Ben Aoua Leila, **Iqbal M. Batiha**, Hadi Jahanshahi, *Existence and uniqueness of the solution for an inverse problem of a fractional diffusion equation with integral condition*, Journal of Function Spaces, Vol. (2022), Article ID 7667370, (2022).
 32. Nouredine Djenina, Adel Ouannas, Taki-Eddine Oussaeif, Giuseppe Grassi, **Iqbal M. Batiha**, Shaher Momani, Ramzi B. Albadarneh, *On the stability of incommensurate h -nabla fractional-order difference systems*, Vol. 6(3), 158, (2022).
 33. Amel Hioual, Adel Ouannas, Taki-Eddine Oussaeif, Giuseppe Grassi, **Iqbal M. Batiha**, Shaher Momani, *On Variable-Order Fractional Discrete Neural Networks: Solvability and Stability*, Fractal and Fractional, Vol. 6(2), 119, (2022).
 34. **Iqbal M. Batiha**, Shaher Momani, Adel Ouannas, Zaid Momani, Samir B. Hadid, *Fractional-order COVID-19 Pandemic Outbreak: modeling and stability analysis*, International Journal of Biomathematics, Vol. 15(01), 2150090, (2022).
 35. Zainouba Chebana, Taki-Eddine Oussaeif, Adel Ouannas, **Iqbal M. Batiha**, *Solvability of Dirichlet Problem For a Fractional Partial Differential equation by using energy inequality and Faedo-Galerkin method*, Innovative Journal of Mathematics, Vol. 1(1), 34-44, (2022).
 36. N.R. Anakira, Osama Ababneh, A.S. Heilat, **Iqbal M. Batiha**, *A New Accurate Approximate Solution of Singular Two-Point Boundary Value Problems*, General Letters in Mathematics, Vol. 12(1), 31-39, (2022).
 37. 'Mohd Taib' Shatnawi, Nouredine Djenina, Adel Ouannas, **Iqbal M. Batiha**, Giuseppe Grassi, *Novel convenient conditions for the stability of nonlinear incommensurate fractional-order difference systems*, Alexandria Engineering Journal, Vol. 61(2), 1655-1663, (2021).
 38. Reyad El. Khazali, **Iqbal M. Batiha**, Shaher Momani. *The Drug Administration via Fractional-order $PI\lambda D\delta$ -Controller*. Progress in Fractional Differentiation and Applications, Vol. 8(1), 53-62, (2022).
 39. Nadjette Debbouche, Adel Ouannas, **Iqbal M. Batiha**, Giuseppe Grassi, Mohammed K. A. Kaabar, Hadi Jahanshahi, Ayman A. Aly, Awad M. Aljuaid, *Chaotic Behaviour Analysis of a New Incommensurate Fractional-order Hopfield Neural Network System*, Complexity, Vol. 2021, (2021).
 40. A. Othman Almatroud, Adel Ouannas, Giuseppe Grassi, **Iqbal M. Batiha**, Ahlem Gasri, M. Mossa Al-sawalha, *Different Linear Control Laws for Fractional Chaotic Maps Using Lyapunov Functional*, Archives of Control Sciences, Vol. 31(4), (2021).
 41. Adel Ouannas, **Iqbal M. Batiha**, Stelios Bekiros, Jinping Liu, Hadi Jahanshahi, Ayman A. Aly, Abdulaziz H Alghtani, *Synchronization of the Glycolysis Reaction-Diffusion Model via Linear Control Law*, Entropy, Vol. 23(11), (2021).
 42. Adel Ouannas, Amina-Aicha Khennaoui, **Iqbal M. Batiha**, Viet-Thanh Pham. *Synchronization between fractional chaotic maps with different*



- dimensions*. In: Ahmed G. Radwan, Farooq Ahmed Khanday, Lobna A. Said (eds) Fractional-Order Design: Devices, Circuits, and Systems. Academic Press, London, United Kingdom, (2022) 89-121. (Chapter in the Book).
43. Adel Ouannas, Amina-Aicha Khennaoui, **Iqbal M. Batiha**, Viet-Thanh Pham. *Stabilization of different dimensional fractional chaotic maps*. In: Ahmed G. Radwan, Farooq Ahmed Khanday, Lobna A. Said (eds) Fractional-Order Design: Devices, Circuits, and Systems. Academic Press, London, United Kingdom, (2022) 123-155. (Chapter in the Book).
44. Amina-Aicha Khennaoui, Adel Ouannas, **Iqbal M. Batiha**, Viet-Thanh Pham. *Chaos in fractional-order difference systems*. In: Ahmed Radwan, Farooq Khanday, Lobna Said (eds) Fractional Order Systems: An Overview of Mathematics, Design, and Applications for Engineers. Academic Press, London, United Kingdom, (2021) 257-286. (Chapter in the Book).
45. Nadjette Debbouche, Adel Ouannas, **Iqbal M. Batiha**, Giuseppe Grassi, *Chaotic dynamics in a novel COVID-19 pandemic model described by commensurate and incommensurate fractional-order derivatives*, Nonlinear Dynamics, Vol. 2021, (2021).
46. Ramzi B. Albadarneh, **Iqbal M. Batiha**, A.K. Alomari, Nedat Tahat, *Numerical approach for approximating the Caputo fractional-order derivative operator*, AIMS Mathematics, Vol. 6, no. 11, (2021), 12743-12756.
47. Jamal Oudetallah, **Iqbal M. Batiha**, *On Almost Expandability in Bitopological Spaces*, International Journal of Open Problems in Computer Science and Mathematics, Vol. 14, no. 3, (2021), 43-48.
48. Ramzi B. Albadarneh, A.K. Alomari, Nedat Tahat, **Iqbal M. Batiha**. *Analytic Solution of Nonlinear Singular BVP with Multi-order Fractional Derivatives in Electrohydrodynamic Flows*. TWMS J. App. Eng. Math.. Vol. 11 (4), 2021, 1125-1137.
49. **Iqbal M. Batiha**, Jamal Oudetallah, Adel Ouannas, Abeer A. Al-Nana, Iqbal H. Jebril, *Tuning the Fractional-order PID-Controller for Blood Glucose Level of Diabetic Patients*, International Journal of Advances in Soft Computing and its Applications, Vol. 13 (2), 2021, 1-10.
50. Jamal Ouderallah, Mohammad M. Rousan, **Iqbal M. Batiha**, *On D-metacompactness in Topological Spaces*, Journal of Applied Mathematics and Informatics, Vol. 39 (5-6), 2021, 919-926.
51. Mohd Taib Shatnawi, Adel Ouannas, Ghenaïet Bahia, **Iqbal M. Batiha**, Giuseppe Grassi, *The Optimal Homotopy Asymptotic Method for Solving Two Strongly Fractional-Order Nonlinear Benchmark Oscillatory Problems*, Mathematics, Vol. 9 (18), 2021, 1754.
52. Ramzi B. Albadarneh, **Iqbal M. Batiha**, Ahmad Adwai, Nedat Tahat, Abdel-Kareem N. Alomari. *Numerical approach of Riemann-Liouville fractional derivative operator*, International Journal of Electrical and Computer Engineering, Vol. 11 (6), 2021, 5367-5378.
53. Adel Ouannas, **Iqbal M. Batiha**, Amina-Aicha Khennaoui, Iqbal H. Jebril, *On the 0-1 Test for Chaos Applied to the Generalized Fractional-order*



- Arnold Map*, 2021 International Conference on Information Technology (ICIT 2021-Proceeding), Amman, Jordan, 2021, 242–245, 9491633.
54. Adel Ouannas, **Iqbal M. Batiha**, Amina–Aicha Khennaoui, Amjed Zraiqat, Abeer A. Al-Nana, *Novel Control Law for the Fractional-order Chaotic Duffing Map*, 2021 International Conference on Information Technology (ICIT 2021-Proceeding), Amman, Jordan, 2021, 238–241, 9491768.
55. Ramzi B. Albadarneh, Adel Ouanna, **Iqbal M. Batiha**, *Identical Chua's circuits application using hybrid dislocated synchronization scheme*, 2021 International Conference on Information Technology (ICIT 2021-Proceeding), Amman, Jordan, 2021, 139–142, 9491746, [Scopus: Q4].
56. Jamal Oudetallah, Ghenaïet Bahia, Adel Ouannas, **Iqbal M. Batiha**, *The Quotient Homotopy Analysis Method for Solving Nonlinear Initial Value Problems*, 2021 International Conference on Information Technology (ICIT 2021-Proceeding), Amman, Jordan, 2021, 195-199, 9491751.
57. Adel Ouannas, Fatiha Mesdoui, Shaher Momani, **Iqbal M. Batiha**, Giuseppe Grassi, *Synchronization of FitzHugh-Nagumo reaction-diffusion systems via one-dimensional linear control law*, Archives of Control Sciences, Vol. 31, no. 2, (2021), 333–345.
58. Ramzi B. Albadarneh, **Iqbal M. Batiha**, Adel Ouanna, Shaher Momani, *Modeling COVID-19 Pandemic Outbreak using Fractional-Order Systems*, International Journal of Mathematics and Computer Science, Vol. 16 (4), 2021, 1405–1421.
59. **Iqbal M. Batiha**, Adel Ouannas, Janat Emwas. *A stabilization approach for a novel chaotic fractional-order discrete neural network*. Journal of Mathematical and Computational Science, Vol. 11 (5), 5514-5524, (2021).
60. Reyad El-Khazali¹, Shaher Momani, **Iqbal M. Batiha**. *A New Discrete-Time Model of Fractional-Order PLL*, 3rd International Conference on Signal Processing and Information Security (ICSPIS 2020), Dubai, United Arab Emirates, 2020, pp. 1-4.
61. Nadjette Debbouche, Shaher Momani, Adel Ouannas, 'Mohd Taib' Shatnawi, Giuseppe Grassi, Zohir Dibi, **Iqbal M. Batiha**. *Generating multidirectional variable hidden attractors via newly commensurate and incommensurate non-equilibrium fractional-order chaotic systems*, Entropy, Vol. 23, no. 3, 2021.
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