Benedict Barnes

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RESEARCH

Interests	differential equations · functional analysis · linear algebra · quantum mechanics · Mathematical Modelling · ill-posed problems · chaos · soliton · fractal · optimization techniques
Areas	Modeling and Simulation · Statistical and Nonlinear Physics · Numerical Analysis · Applied Mathematics · Atomic and Molecular Physics, and Optics · Mathematical Physics

RESEARCH SUMMARY

65	218	6	3	1.08	11%
Publications	Citations	h-index	i10-index	Field-weighted impact	World top 10%

Counted from the 65 publications listed below, 2012–2026. Field-weighted impact is the mean over the 47 works scored for it; 1.00 is the world average for works of the same field, type and year. 5 of the 47 papers scored for it are among the world's most cited tenth for their field, type and year.

POSITIONS

Associate Professor 2024–present
MATHEMATICS, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

EDUCATION AND QUALIFICATIONS

Dr. 2016–2031
MATHEMATICS, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI, Ghana

DISTINCTIONS, MEMBERSHIPS AND SERVICE

Taylor & Francis Group 2020–present
Mathematics, Abingdon, United Kingdom

American Mathematical Society
Ann Arbor, United States

Ghana Mathematics Society
Mathematics, KUMASI, Ghana

International Association for Pure and Applied Mathematics
Lucknow, India

Reviewer
Bioresource Technology, Elsevier, Boston, United States

Reviewer
Mathematical Reviews, Ann, Arbor, United States

Reviewer

Science Publishing Group, New York, United States

Reviewer
Asian Journal of Mathematics and Computer Research, Manchester, United Kingdom

Reviewer
Springer Nature, Adis, United States

Reviewer
Physica A, Elsevier, Boston, United States

PUBLICATIONS

Journal articles 63

1. Mordecai Opoku Ohemeng, Joseph Ackora-Prah, **Benedict Barnes**, Ishmael Takyi (2026). Energy orthogonality and conformational recovery dynamics of torsional DNA solitons. *Physica A Statistical Mechanics and its Applications*. https://doi.org/10.1016/j.physa.2026.131995
2. Mordecai Opoku Ohemeng, Bernard Asamoah Afful, Joseph Ackora-Prah, **Benedict Barnes**, Ishmael Takyi (2026). Enhancing autonomous vehicle control with lateral error feedback analysis. *IFAC Journal of Systems and Control*. https://doi.org/10.1016/j.ifacsc.2025.100359
3. Mordecai Opoku Ohemeng, Joseph Ackora-Prah, **Benedict Barnes**, Ishmael Takyi (2026). Nonlinear dynamics and topological transitions in DNA supercoiling. *Nonlinear Dynamics*. https://doi.org/10.1007/s11071-026-12400-3
4. Mordecai Opoku Ohemeng, Joseph Ackora-Prah, **Benedict Barnes**, Ishmael Takyi (2026). Stability of periodic orbits in the perturbed sine-Gordon equation. *Nonlinear science.*. https://doi.org/10.1016/j.nls.2026.100124
5. Emmanuel Mensah, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2026). The Two Modified G′G-Expansion Methods for Obtaining Solitons of the Korteweg-De Vries Equation. *Advances in Mathematical Physics*. https://doi.org/10.1155/admp/9869666
6. William Obeng-Denteh, **B Benedict** (2026). The modified homogeneous balance method for finding solitons of the fractional Kaup-Kupershmidt equation. *Physics Letters A*. https://www.sciencedirect.com/science/article/pii/S0375960126002793
7. **B Barnes** (2026). The solitons of the coupled modified Korteweg–de Vries equation using a modified homogeneous balance method. *Journal of Computational Mathematics and Data Science*. https://www.sciencedirect.com/science/article/pii/S2772415826000040
8. **B Barnes** (2025). A methodological approach to solving the Korteweg–de Vries equation in its various forms. *Scientific African*. https://www.sciencedirect.com/science/article/pii/S2468227625003345
9. Henry Kwasi Asiedu, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). Exact solution of system of nonlinear fractional partial differential equations by modified semi-separation of variables method. *Partial Differential Equations in Applied Mathematics*. https://doi.org/10.1016/j.padiff.2025.101247
10. Isaac Addai, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). Fractional Gauss Hypergeometric Power Series Method for Solving Fractional Partial Differential Equations. *Abstract and Applied Analysis*. https://doi.org/10.1155/aaa/7650251
11. **B Barnes** (2025). Mathematical modeling of COVID-19 with a constant spatial diffusion term in Ghana. *Computational Methods for Differential Equations*. https://cmde.tabrizu.ac.ir/article_18320.html
12. Henry Kwasi Asiedu, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). Modified Semiseparation of Variables Methods for Solving the System of Nonlinear Fractional Partial Differential Equations. *International Journal of Differential Equations*. https://doi.org/10.1155/ijde/3634269
13. Mordecai Opoku Ohemeng, Joseph Ackora-Prah, **Benedict Barnes**, Ishmael Takyi (2025). Proportional feedback and optimal control of perturbed sine-Gordon kink solitons. *Chaos Solitons & Fractals*. https://doi.org/10.1016/j.chaos.2025.116645

14. Henry Kwasi Asiedu, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). Solving system of nonlinear fractional partial differential equations by fractional semi-separation of variables method. *Research in Mathematics*. https://doi.org/10.1080/27684830.2025.2476871

15. Henry Kwasi Asiedu, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). The Analytic Methods for Solving the System of Fractional Order Brusselator Equations. *International Journal of Differential Equations*. https://doi.org/10.1155/ijde/8436408

16. Francis Tuffour, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). The Exact Solution of the Fractional Burger's Equation using the Modified Homogeneous Balance Method. *Scientific African*. https://doi.org/10.1016/j.sciaf.2025.e02789

17. Isaac Addai, **B Barnes** (2025). The Exact Solutions of the Fractional Partial Differential Equations Using the Fractional Prabhakar Power Series Method. *International Journal of Mathematics and Mathematical Sciences*. https://doi.org/10.1155/ijmm/6671108

18. Francis Tuffour, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2025). The Modified Homogeneous Balance Method for solving fractional Cahn–Allen and equal width equations. *Partial Differential Equations in Applied Mathematics*. https://doi.org/10.1016/j.padiff.2025.101246

19. Isaac Addai, Henry Kwasi Asiedu, **Benedict Barnes** (2025). The exact solution of the composite fractional differential equation. *Chaos Solitons & Fractals*. https://doi.org/10.1016/j.chaos.2025.116288

20. Asambo Awini Wilbert, Mohammed Muniru Iddrisu, **Benedict Barnes** (2024). Convexity Properties in Non-Newtonian Calculus and Their Applications. *European Journal of Mathematical Analysis*. https://doi.org/10.28924/ada/ma.4.19

21. Martin Anokye, **Benedict Barnes**, Samuel E. Assabil, Eric Okyere, Agnes A. Konadu (2024). Fractional-Order Delay Cobweb Model and Its Price Dynamics. *International Journal of Differential Equations*. https://doi.org/10.1155/2024/1209433

22. Isaac Addai, **B Barnes** (2024). Modified fractional power series method for solving fractional partial differential equations. *Scientific African*. https://www.sciencedirect.com/science/article/pii/S2468227624004095

23. Francis Tuffour, **Benedict Barnes**, Isaac Kwame Dontwi, Kwaku Forkuoh Darkwah (2024). The Modified Homogeneous Balance Methods for solving Korteweg–DeVries equations. *Partial Differential Equations in Applied Mathematics*. https://doi.org/10.1016/j.padiff.2024.101035

24. Emmanuel Frimpong, Edward Ankapong, Kwadwo Owusu Boakye, Eugene Ansah, Opoku Gyamfi, **Benedict Barnes**, Matt Dodd, Godfred Darko (2024). Uptake and in-vitro bioaccessibility of toxic metals in cocoa beans: Human health risks. *Environmental Geochemistry and Health*. https://doi.org/10.1007/s10653-024-02345-0

25. Martin Anokye, **Benedict Barnes**, Francis Ohene Boateng, Agnes Adom-Konadu, John Amoah-Mensah (2023). Price Dynamics of a Delay Differential Cobweb Model. *Discrete Dynamics in Nature and Society*. https://doi.org/10.1155/2023/1296562

26. **Benedict Barnes**, Martin Anokye, Mohammed Muniru Iddrisu, Bismark Gawu, Emmanuel Afrifa (2023). The Analytic Solutions of the Fractional-Order Model for the Spatial Epidemiology of the COVID-19 Infection. *Advances in Mathematical Physics*. https://doi.org/10.1155/2023/5578900

27. Joseph Ackora Prah, Valentine Acheson, **Benedict Barnes**, Ishmael Takyi, Emmanuel Owusu-Ansah (2022). A 2-Phase Method for Solving Transportation Problems with Prohibited Routes. *Pakistan Journal of Statistics and Operation Research*. https://doi.org/10.18187/pjsor.v18i3.3911

28. E Owusu-Ansah, J Ackora-Prah, V Acheson, **B Barnes** (2022). A Two-Phase Method for Solving Transportation Models with Prohibited Routes. *Pakistan Journal of Statistics and Operation Research*. https://scholar.google.com/scholar?cluster=5486893016603458747&hl=en&oi=scholarr

29. Gilbert Kofi Selormey, **Benedict Barnes**, Edward A. Awafo, Francis Kemausuor, Lawrence Darkwah (2022). Development of mathematical model for predicting methane-to-carbon dioxide proportion in anaerobic biodegradability of cattle blood and rumen content. *Energy Conversion and Management X*. https://doi.org/10.1016/j.ecmx.2022.100250

30. I. Takyi, S. Gyampoh, **B. Barnes**, J. Ackora-Prah, G.A. Okyere (2022). Kink collision in the noncanonical φ 6 model: A model with localized inner structures. *Results in Physics*. https://doi.org/10.1016/j.rinp.2022.106197

31. **Benedict Barnes**, Ishmael Takyi, Bright Emmanuel Owusu, Francis Ohene Boateng, Augustine Saahene, Emmanuel Saarah Baidoo, Jennifer Aduko Adombire (2022). Mathematical Modelling of the Spatial Epidemiology of COVID-19 with Different Diffusion Coefficients. *International Journal of Differential Equations*. https://doi.org/10.1155/2022/7563111

32. ISHMAEL TAKYI, **BENEDICT BARNES**, HOESE MICHEL TORNYEVIADZI, JOSEPH ACKORA-PRAH (2022). Scattering of kinks in noncanonical sine-Gordon Model. *TURKISH JOURNAL OF PHYSICS*. https://doi.org/10.55730/1300-0101.2690

33. **Benedict Barnes**, Isaac Addai, Francis Ohene Boateng, Ishmael Takyi (2022). Solving the Helmholtz Equation Together with the Cauchy Boundary Conditions by a Modified Quasi-Reversibility Regularization Method. *Journal of Mathematics*. https://doi.org/10.1155/2022/5336305

34. **Benedict Barnes**, Ishmael Takyi, Joseph Ackora-Prah, George Hughes, Emmanuel Saarah Baidoo (2022). The mathematical model for marital interactions in Ghana. *Scientific African*. https://doi.org/10.1016/j.sciaf.2022.e01449

35. **Benedict Barnes**, Anthony Y. Aidoo, Joseph Ackora-Prah (2022). Using a Divergence Regularization Method to Solve an Ill-Posed Cauchy Problem for the Helmholtz Equation. *Abstract and Applied Analysis*. https://doi.org/10.1155/2022/4628634

36. Francis Ohene Boateng, Joseph Ackora-Prah, **Benedict Barnes**, John Amoah-Mensah (2021). A Finite Difference Fictitious Domain Wavelet Method for Solving Dirichlet Boundary Value Problem. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v14i3.3893

37. Gilbert Kofi Selormey, **Benedict Barnes**, Francis Kemausuor, Lawrence Darkwah (2021). A review of anaerobic digestion of slaughterhouse waste: effect of selected operational and environmental parameters on anaerobic biodegradability. *Reviews in Environmental Science and Bio/Technology*. https://doi.org/10.1007/s11157-021-09596-8

38. **Benedict Barnes**, Joseph Ackora-Prah, Francis Ohene Boateng, Leticia Amanor (2021). Mathematical modelling of the epidemiology of COVID-19 infection in Ghana. *Scientific African*. https://doi.org/10.1016/j.sciaf.2021.e01070

39. Fredrick Asenso Wireko, **Benedict Barnes**, Charles Sebil, Joseph Ackora-Prah (2021). The Eigenspace Spectral Regularization Method for Solving Discrete Ill-Posed Systems. *Journal of Applied Mathematics*. https://doi.org/10.1155/2021/4373290

40. Ishmael TAKYI, **Benedict BARNES**, Joseph ACKORA-PRAH (2021). Vacuum polarization energy of the kinks in the sinh-deformed models. *TURKISH JOURNAL OF PHYSICS*. https://doi.org/10.3906/fiz-2103-32

41. **Benedict Barnes**, Francis Ohene Boateng, Charles Sebil, Enock Owusu (2020). Mathematical Modeling of Wastes Pile-Up in Kwadaso Municipality in Ashanti, Ghana. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v13i4.3813

42. EGJ Owusu-Ansah, **B Barnes** (2019). Quantifying economic risk: An application of extreme value theory for measuring fire outbreaks financial loss. *Financ. Math. Appl*. https://www.researchgate.net/profile/Emmanuel-Owusu-Ansah-2/publication/338543494_QUANTIFYING_ECONOMIC_RISK_AN_APPLICATION_OF_EXTREME_VALUE_THEORY_FOR_MEASURING_FIRE_OUTBREAKS_FINANCIAL_LOSS/links/5e1b3f1c4585159aa4cb4560/QUANTIFYING-ECONOMIC-RISK-AN-APPLICATION-OF-EXTREME-VALUE-THEORY-FOR-MEASURING-FIRE-OUTBREAKS-FINANCIAL-LOSS.pdf

43. **B Barnes** (2019). Quantifying economic risk: An application of extreme value theory for measuring fire outbreaks financial loss. Financ. *Math. Appl*. https://scholar.google.com/scholar?cluster=8748466037750783035&hl=en&oi=scholarr

44. **Benedict Barnes**, I. A. Adjei, C. Sebil (2019). The Mathematical Modelling of Refuse Build-up on the University Campus: A Case Study of KNUST Campus. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v12i4.3546

45. **Benedict Barnes**, C. Sebil, I. K. Dontwi (2019). The Quotient Inequalities. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v12i2.3384

46. **Benedict Barnes**, C. Sebil, A. Quaye (2018). A Generalization of Integral Transform. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v11i4.3330

47. **CSEH Benedict Barnes**, C Sebil (2018). A Note on the Quasi-normed linear space. *Advances in Theoretical and Applied Mathematics*.

48. **B Barnes**, C Abaitey (2018). Construction of Symmetric Matrices using the Odd and Even Matrices. *Asian Journal of Mathematics and Computer Research*. https://www.researchgate.net/profile/Collins-Abaitey/publication/325763300_CONSTRUCTION_OF_SYMMETRIC_MATRICES_USING_THE_ODD_AND_EVEN_MATRICES/links/5b2273b3aca272277fab4d2c/CONSTRUCTION-OF-SYMMETRIC-MATRICES-USING-THE-ODD-AND-EVEN-MATRICES.pdf

49. **Benedict Barnes**, I. A. Adjei, S. K. Amponsah, E. Harris (2018). Product-Normed Linear Spaces. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v11i3.3284

50. **Benedict Barnes**, E.D.J. Owusu-Ansah, S.K. Amponsah, C. Sebil (2018). The Proofs of Product Inequalities in Vector Spaces. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v11i2.3209

51. **Benedict Barnes**, E.D J.O. Wusu-Ansah, S. K. Amponsah, I.A. Adjei (2018). The Proofs of Triangle Inequality Using Binomial Inequalities. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v11i1.3165

52. **Benedict Barnes**, E. Harris, N. F. Darquah, G. Hughes (2018). The Proofs of the Arithmetic-Geometric Mean Inequality Through Both the Product and Binomial Inequalities. *European Journal of Pure and Applied Mathematics*. https://doi.org/10.29020/nybg.ejpam.v11i4.3300

53. **CSEH Benedict Barnes**, IA Adjei (2018). The product-normed linear space. *European Journal of Pure and Applied Mathematics*.

54. **B Barnes**, EDJ OWUSU-ANSAH, C Agyare (2017). DIAGONAL REARRANGEMENT METHOD FOR EVALUATING DETERMINANT OF A 3× 3 MATRIX. *Asian Journal of Mathematics and Computer Research*. https://www.researchgate.net/profile/Benedict-Barnes/publication/355732576_A_review_of_anaerobic_digestion_of_slaughterhouse_waste_effect_of_selected_operational_and_environmental_parameters_on_anaerobic_biodegradability/links/619fe5f07323543e2108fce7/A-review-of-anaerobic-digestion-of-slaughterhouse-waste-effect-of-selected-operational-and-environmental-parameters-on-anaerobic-biodegradability.pdf

55. **Benedict Barnes**, F Boateng, S Amponsah, E Osei-Frimpong (2017). On the Notes of Quasi-Boundary Value Method for Solving both Cauchy-Dirichlet Problem of the Helmholtz Equation. *British Journal of Mathematics & Computer Science*. https://doi.org/10.9734/bjmcs/2017/32727

56. **B Barnes**, J Ackora-Prah (2016). A two-dimensional chebyshev wavelet method for solving partial differential equations. *Journal of Mathematical Theory and Modeling*. https://scholar.google.com/scholar?cluster=7884077332423122203&hl=en&oi=scholarr

57. **B Barnes**, J Ackora-Prah (2016). Convex regularization method for solving Cauchy Problem of the Helmholtz Equation. *Mathematical theory and modeling*. https://www.academia.edu/download/95944385/234680490.pdf

58. **Benedict Barnes** (2016). Polynomial Integral Transform for Solving Differential Equations. *European Journal of Pure and Applied Mathematics*.

59. W Obeng-Denteh, **B Barnes** (2014). Epidemiology of chickenpox in Agona West Municipality of Ghana. *Physical Sciences Research International*. https://www.netjournals.org/pdf/PSRI/2014/1/13-037.pdf

60. William Obeng-Denteh, Robert Afrifa, **Benedict Barnes**, Kwaku Addo (2014). Modeling the Epidemiology of Human Papilloma Virus Infection and Vaccination and Its Impact on Cervical Cancer in Ghana. *Journal of Scientific Research and Reports*. https://doi.org/10.9734/jsrr/2014/11019

61. Ahmed Esson, W Obeng-Denteh, **B Barnes** (2014). Vaccination Dynamics of Chickenpox in Agona West Municipality of Ghana. *British Journal of Mathematics & Computer Science*. https://doi.org/10.9734/bjmcs/

2014/7883

62. **Benedict Barnes**, Anthony Y. Aidoo, Kwaku Forkuoh Darkwah, E. Osei-Frimpong (2013). Mathematical Analysis of the Impact ofVaccination in the Spread of Diseases in a Large Susceptible Population. https://doi.org/10.7392/openaccess.23050423

63. **B Barnes** (2012). A Note on the Spread of Infectious Diseases in a Large Susceptible Population. *International Mathematical Forum*. https://www.researchgate.net/profile/Benedict-Barnes/publication/271314690_Modeling_the_Epidemiology_of_Human_Papilloma_Virus_Infection_and_Vaccination_and_Its_Impact_on_Cervical_Cancer_in_Ghana/links/5b083400aca2725783e5cf45/Modeling-the-Epidemiology-of-Human-Papilloma-Virus-Infection-and-Vaccination-and-Its-Impact-on-Cervical-Cancer-in-Ghana.pdf

Book chapters 1

1. Francis Ohene Boateng, Joseph Ackora-Prah, **Benedict Barnes** (2021). Wavelet-Based Method for Solving Linear Elliptic PDE with Dirichlet Boundary Conditions on Irregular Domains. *Book Publisher International (a part of SCIENCEDOMAIN International)*. https://doi.org/10.9734/bpi/tpmcs/v6/2419e

Reports 1

1. **B Barnes**, AFA Marfo, A Brobbey, AO Antwi, MK Baah, E Bessah, Gordon A Awandare (2021). Scientific African. *Scientific African*. https://www.researchgate.net/profile/Temitope-D-Timothy-Oyedotun/publication/356402866_Household_Waste_Generation_Change_in_Waste_Composition_and_the_Exposure_to_COVID-19_in_Guyana_and_Nigeria/links/619fb8b1d7d1af224b241a9b/Household-Waste-Generation-Change-in-Waste-Composition-and-the-Exposure-to-COVID-19-in-Guyana-and-Nigeria.pdf?_sg%5B0%5D=started_experiment_milestone&origin=journalDetail