**BIO SKETCH**

Celestin Wafo Soh

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# **CURRENT POSITION TITLE**

# Full Professor

# **EDUCATION**

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| --- | --- |
| 1998–2000 | PhD (Applied Mathematics), Univ. of the Witwatersrand, South Africa  **Thesis:** *Lie algebraic properties of systems of differential equations.*  **Advisor: Prof. F. M. Mahomed** |
| 1997–1998 | MSc (Applied Mathematics, Distinction), Univ. of the Witwatersrand, South Africa. Thesis: *Lie group approach to Cauchy’s problem: solution of an initial-value problem for the Black-Scholes model.*  **Advisor: (Late) Prof. N. H. Ibragimov** |
| 1993–1994 | BSc Honors (Pure Mathematics, Distinction), Univ. of Yaoundé, Cameroon **Research Report:** *Existence and uniqueness of solutions of Maxwell-Vlasov system on Minkowski’s spacetime****.* Advisor: Prof. N. Noutchegueme** |
| 1990–1993 | BSc (Pure Mathematics, Distinction), Univ. of Yaoundé, Cameroon |

# **PROFESSIONAL EXPERIENCE**

04/14/19 – date **Professor of Mathematics**, Jackson State University

11/23/2022 – date **Visiting Professor**, Finance & Investment Management, University of Johannesburg, Johannesburg, South Africa

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| --- | --- |
| 08/10/16 – 08/10/19 | **Visiting Associate Professor**, School of Computer Science and Applied Mathematics, University of the Witwatersrand, Johannesburg, South Africa |
| 07/17/16 – 08/12/16 | **Visiting Research Scholar**, DST–NRF Center of Excellence in Mathematical and Statistical Sciences, University of the Witwatersrand,  Johannesburg, South Africa |
| 04/14/10 – 04/14/19 | **Associate Professor of Mathematics**, Jackson State University |
| 8/18/05- 04/14/10 | **Assistant Professor of Mathematics**, Jackson State University |
| 4/06/04-8/8/05 | Visiting Research Scholar, MMAE, Univ. Central FL. |
| 02/19/03-3/31/04 | **Senior Lecturer of Applied Mathematics**  Univ. of the Witwatersrand, Johannesburg, South Africa. |
| 11/21/99-2/18/03 | **Lecturer of Applied Mathematics**  Univ. of the Witwatersrand, Johannesburg South Africa. |

# **SELECTED CERTIFICATIONS**

12. Process Mining: Data Science in Action (01/20/2015, **Eindhoven University of Technology and Coursera**, Distinction)

11. Introduction to TypeScript (05/16/2015, **Microsoft Corporation and EdX**)

10. Principles of Reactive Programming (01/21/2014, **Ecole Polytechnique Fédérale de Lausanne and Coursera**, Distinction)

9. Statistical Mechanics: Algorithms and Computation (05/18/2014, **Ecole Normale Superieure and Coursera**)

8. Big Data for Better Performance (01/25/ 2013, **Open 2 Study**)

7. Functional Programming Principles with Scala (05/03/2013, **Ecole Polytechnique Fédérale de Lausanne and Coursera**, Distinction)

6. Image and video processing: From Mars to Hollywood with a stop at the hospital (03/18/2013, **Duke University and Coursera**, Distinction)

5. Beginning Games Programming with C# (11/13/2013, **University of Colorado Springs and Coursera**)

4. Introduction to Systematic Program Design (09/11/2013, **University of British Columbia and Coursera**)

3. Programming Languages (04/02/2013, **University of Washington and Coursera**)

2. Neural Network and Machine Learning (12/19/2012, **University of Toronto and Coursera**, Distinction)

1. Quantum Mechanics and Quantum Computation (12/06/2012, **Berkley University of California and Coursera**, Distinction)

# **RESEARCH INTERESTS**

* Scientific Machine Learning
* Mathematical Foundation of Generative Modeling
* Computational Finance
* Computational Physics
* Computational Optimal Transport
* Mathematical Methods for Cybersecurity
* Computation with Encrypted Data (Fully Homomorphic Encryption)
* Lie Group Analysis of PDEs and SDEs
* Functional Programing

# **PATENT**

# Njilla, Laurent Y., and Celestin Wafo Soh. "System and method for privacy preservation in cyber threat." U.S. Patent 11,647,041 issued May 9, 2023.

# **SELECTED PUBLICATIONS**

1. F. Ongonwou, T. B. Ekobo, H. M. Techou Nganso, Abdouraman**,** C. Wafo Soh and M. G. Kwato, 2022. *Spectral approaches based on Sturmian Coulomb functions on momentum space for atoms interacting with low-frequency strong laser field fields***, Physica Scripta**, 97(11), p. 115402.
2. H. Azemtsa Donfack, C. Wafo Soh, A. Kotze 2022. Smile interpolation with radial basis functions, **International Journal of Theoretical and Applied Finance**, 25(07n08), p.2250030.
3. Célestin Wafo Soh 2021 *An Evolutionary Approach to the Automatic Classification of Automorphisms of Lower-Dimensional Lie Algebras*, **Experimental Mathematics**, 30:2, 191-199, DOI: 10.1080/10586458.2018.1516582
4. C. Wafo Soh, 2018 *Symbolic solutions of simultaneous first-order PDEs in one unknown*, **Mathematica Journal**, 20, 1–16. DOI: dx.doi.org/doi:10.3888/tmj.20-2.
5. C. Wafo Soh et al., 2018 *Learning quasi-identifiers for privacy-preserving exchanges - a rough set theory approach*, **Granular Computing**, 1–14. DOI: https://doi.org/10.1007/s41066-0180127-0
6. C. Wafo Soh , F. M. Mahomed, 2016 *Hypercomplex analysis and integration of systems of ordinary differential equations*, **Mathematical Methods in the Applied Sciences**, 39, 41394157. DOI: 10.1002/mma.3852.
7. A. N. Sandjo, C. Wafo Soh, 2014 *Space-Time Estimates of Mild Solutions of a Class of Higher Order Semilinear Parabolic Equations in Lp*, **Nonautonomous Dynamical Systems**, 1(1), 8392.
8. C. Wafo Soh, 2014 *Optimal filtering of measured spectral intensities, estimation of light attenuation coefficient and prediction of the euphotic zone in shallow waters*, **International Journal of Machine Learning and Cybernetics**, 5(5), 697-712.
9. M. Washington, P. Kirui and H.J. Cho, C. Wafo Soh, 2012 *Data-driven correction for light attenuation in shallow waters*, **Remote Sensing** 3(4), 335-342.
10. C. Wafo Soh 2010, *Probabilistic approach to diffusion in shear flows of generalized viscoelastic second-grade fluids*, **Journal of Statistical Mechanics: Theory and Experiment**, P11017.
11. C. Wafo Soh 2010, *Comment on ‘A point source solution for unidirectional flow of a viscoelastic fluid’*, **Physics Letters A**, 374(19-20), 2098-2100.
12. C. Wafo Soh 2010, *Symmetry breaking of systems of linear second-order ordinary differential equations with constant coefficients*, **Communications in Nonlinear Science and Numerical Simulations**, 5, 139-143.
13. M Molati, F M Mahomed and C Wafo Soh 2009, *Group classification of a system of partial differential equations modeling flow in collapsible tubes*, **Journal of Nonlinear Mathematical Physics**, 6, 179-208.
14. C. Wafo Soh 2009, *Solution to problem 2008-1: inequalities for Sobolev integrals*, **Electronic Journal of Differential Equations-Problem Section**, 20, 1-4.
15. C. Wafo Soh 2009, *Isospectral Euler-Bernoulli beams via factorization and the Lie method*, **International Journal of Non-linear Mechanics**, 44(4), 396-403.
16. C Wafo Soh 2008, *Euler-Bernoulli beams from a symmetry standpoint-characterization of equivalent equations*, **Journal of Mathematical Analysis and Applications**, 345(1), 387-395.
17. O I Morozov and C Wafo Soh 2008, *Equivalence problem for the Euler-Bernoulli beam equation via Cartan’s method*, **Journal of Physics A: Mathematical and Theoretical**, 41 (13), 135206-135220.
18. G Demirkaya, C. Wafo Soh and O J Ilegbusi 2008, *Direct solution of the Navier Stokes equations by radial basis functions***, Applied Mathematical Modelling**,32 (9), 1848-1858.
19. A H Kara, F M Mahomed, I Naeem and C Wafo Soh 2007 *Partial Noether operators and first integrals via partial Lagrangians*, **Mathematical Methods in Applied Sciences**, 30(16), 2079-2089.
20. C Wafo Soh 2005 *Invariant solutions of the unidirectional flow of an electrically charged power law non-Newtonian fluid over a flat plate in presence of a transverse magnetic field*, **Communications in Nonlinear Sciences and Numerical Simulations**, 10 (5), 537-548.
21. C Wafo Soh and F M Mahomed 2004 *Reduction of order for systems of two second-order ordinary differential equations*, **Journal of Nonlinear Mathematical Physics**, 11 (1), 13-20.
22. C A Pooe, F M Mahomed and C Wafo Soh 2004 *Fundamental solutions for zero-coupon bond pricing models*, **Nonlinear Dynamics**, 6 (1), 69-76.
23. C Wafo Soh 2003 *Incompressible Laminar 2D Steady Thermal Boundary Layers with Temperature dependent Kinematic Viscosity and Thermal Diffusivity*, **International Journal of Non-Linear Mechanics** 38 (7), 991-997.
24. C Pooe, F M Mahomed and C Wafo Soh 2003 *Invariant solutions and conservation laws of the Black-Scholes equation*, **Mathematical and Computational Applications**, 8 (1), 63-70 .
25. C Wafo Soh, F M Mahomed and C Qu 2002 *Contact symmetries of scalar ordinary differential equation*, **Nonlinear Dynamics**, 28 (2), 213-230.
26. C Wafo Soh and F M Mahomed 2001 *Canonical Forms for Systems of two Second-order Ordinary Differential Equations admitting four-dimensional Symmetry Lie Algebras*, **Journal of Physics A: Mathematical and General** 34, 2883-2911.
27. C Wafo Soh and F M Mahomed 2001 *Linearization Criteria for a System of Second-order Ordinary Differential Equations*, **International Journal of Non-linear Mechanics** 36(4), 671677.
28. C Wafo Soh and F M Mahomed 2001 *Integration of stochastic ordinary differential equations from a symmetry standpoint*, **J. Phys. A: Math. Gen.** 34, 177-192.
29. C Wafo Soh and F M Mahomed 2000 *Static Perfect Fluid Cylinders-New Approach to Kramer’s Equations*, **Journal of Physics A: Mathematical and General** 33, 6817-6823.
30. C Wafo Soh and F M Mahomed 2000 *Nonstatic Shear-free Spherically Symmetric Charged Perfect Fluid Distributions: a Symmetry Approach*, **Classical and Quantum Gravity** 17, 30633072.
31. C Wafo Soh and F M Mahomed 2000 *Symmetry Breaking for Systems of two Linear Ordinary Differential Equations*, **Nonlinear Dynamics** 22, 121-133.
32. C Wafo Soh and F M Mahomed 1999 *Noether Symmetries of y”*= *f*(*x*)*yn with applications to non-static spherically symmetric perfect fluid solutions*, **Classical and Quantum Gravity** 16, 3553-3566.
33. N Noutchegueme and C Wafo Soh 1999 *Systeme de Maxwell-Vlasov sur l’espace-temps de Minkowski* (in French) (translation: *Maxwell-Vlasov system on Minkowski’s spacetime*), **Ann. Fac. Sci Univ. Yde I. Serie Math-Info-Phys-Chim**. Vol. 32 no 1, 33-41.

# **GRANTS**

1. Co-PI (PI: Almesha L. Campbell) 2023: NSF I-Corps. Subaward Number: OSA00000170. Amount: $ 1,000,000 /5 years.
2. Co-PI (PI: Hermann Azemtsa Donfack) 2023: URC – Inverse Problems in Finance: Calibration of the Local Volatility Surface using an Artificial Neural Network, University of Johannesburg. Amount: R 191, 495. Award Number: 2023URC00669.
3. Co-PI (PI: Hermann Azemtsa Donfack) 2021: URC – *Portfolio Selection Rules based on Formal Concept Analysis*, College of Business and Economics, University of Johannesburg. Amount: R 162, 432. Award Number: 2021URC00361.
4. PI (no Co-PIs) 2019: *End-to-end Supply Chain Management through Blockchain: Preventing Counterfeit and Malicious Products*, US Air Force Research Lab. Awarded: 3/15/2019-12/31/2019. Amount: $ 117, 145.
5. PI (no Co-PIs) 2016: Rough set theory approach to cyber security information sharing, submitted to the US Air Force Summer Faculty Fellowship Program (SFFP). Awarded: 6/20/2017-8/20/2017. Amount: $ 19,069.05
6. Co-PI (with PI: T. A. Kwembe, Co-PIs: J. Talley, D. Chen, R. Gentry): Progress in integrating technology in teaching, learning and research in Mathematics at HBCUs. Funding Agency: NSF. Amount: $200,000 for 2 years starting on 07/01/2012. Award#: DMS-1214359.
7. Co-PI (with PI: H J Cho, Co-PI: H. Kim) : Hyperspectral algorithm development and dimension reduction for improved detection of shallow costal submerged vegetation. Program Name: 2008 NGA University Research Initiatives (NURI). Funding Agency: National Geospatial Intelligence Agency. Amount: $ 299,999 for 2 years starting 10/6/08. Award #: HM1582-081-0049.

**COLLABORATORS**

* Prof. Moise Kwato Njock, University of Douala, Cameroon
* Dr. Hermann Azemtsa Donfack, University of Johannesburg, South Africa
* Dr. Bassirou Diatta, Phillips Exeter Academy, New Hampshire
* Prof. Motlatsi Molati, National University of Lesotho
* Prof. Jules Sadefo Kamdem, Montpelier University, France