

Alfred Wanyama Manyonge, PhD

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EDUCATION

(a) University Education:

1992-1997: Ph.D Student in Applied Mathematics, University of Nairobi, Kenya and University of Auckland, New Zealand. Graduated in 1997

1992: Postgraduate Student in Geothermal Energy Studies, Geothermal Institute, University of Auckland, New Zealand-(Dip. Geotherm. Tech.)

1997: Doctor of Philosophy (Ph.D) in Applied Mathematics, University of Nairobi, Kenya-(Title of thesis: *Mathematical Modelling of the Olkaria Geothermal Reservoir*)

September 1987-August 1989: Postgraduate M.Sc Student in Applied Mathematics (Fluid Dynamics and Numerical Analysis), University of Nairobi, Kenya

1989: M.sc in Applied Mathematics (Fluid Dynamics and Numerical Analysis), University of Nairobi, Kenya

September 1984-August 1987: Undergraduate B.Sc student at the University of Nairobi, Kenya

1987: B.Sc in Pure and Applied Mathematics (First Class Honours), University of Nairobi, Kenya

(b) Higher School Education:

1981-1982: 'A' LEVEL, Friends School Kamusinga, Bungoma District, Bungoma County, Kenya

Subjects Studied: Mathematics, Physics, Chemistry, General Paper

Results Attained: Kenya Advanced Certificate of Education (K.A.C.E.), 3 Principal passes

(c) Secondary School Education:

1981-1982: 'O' LEVEL, Friends School Kamusinga, Bungoma District, Bungoma County, Kenya

Subjects Studied: Mathematics, Additional Mathematics, SSP Physics, SSP Chemistry, SSP Biology, Geography, Kiswahili, Agriculture, English Language. (SSP- School Science Project)

Results Attained: Division I, aggregate 16 points

(d) Primary School Education:

1970-1976: Primary Level, Kipchiria, A.C.K. Primary School, Mount Elgon District, Bungoma County, Kenya

Subjects Studied: English Language, Mathematics, General Science

Results Attained: Certificate of Primary Education (C.P.E.), 29 points

RESEARCH EXPERIENCE

More than 10 years research experience at university level in the field of Pure and Applied Mathematics.

Research Interests:

- (i) Computational Fluid Dynamics
- (ii) MHD fluid flow especially of Nanofluids
- (iii) Singular Cauchy Problems of the Euler-Poisson-Darboux Equations
- (iv) Research in New and Renewable Energies
- (v) Solution of Bio-heat Equation and its applications

TEACHING EXPERIENCE

University of Nairobi: 1990-1996:

Teaching undergraduate students in Mathematics: Calculus, Geometry, Fluid Mechanics, Vector Analysis

Maseno University: May 1996-date:

Teaching both undergraduate and postgraduate students in Mathematics: Calculus, Advanced Calculus, Geometry, Basic Mathematics, Fluid mechanics, Numerical Analysis, Vector Analysis, Ordinary Differential Equations, Partial Differential Equations, Methods

University of Eldoret/Moi University: 2002-2014: (Part-time Lecturer)

Teaching postgraduate D.Phil, M.Phil and undergraduate students in Mathematics: Calculus, Advanced Calculus, Fluid Mechanics, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations, Methods, Dynamics

Moi University: 2012-2014: (Part-time Lecturer)

Teaching postgraduate D.Phil, M.Phil and undergraduate students in Mathematics: Calculus, Advanced Calculus, Fluid Mechanics, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations, Methods, Dynamics

Masinde Muliro University of Science and Technology: 2015-2016:

(Part-time Lecturer)

Teaching postgraduate D.Phil, M.Phil students in Mathematics: Fluid Mechanics, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations.

HONORS AND AWARDS

1. Merit Award: Gandhi Smarak Nidhi Fund, Best University of Nairobi final year student} in the Faculty of Science, 1987, University of Nairobi, Kenya.
2. Merit Scholarship Holder} throughout M.sc and Ph.D

PROFESSIONAL MEMBERSHIP

Member, Inter-University Network of Mathematics and Computer Science Institutions (MACKNET)

SKILLS AND TRAINING

Trained in various Information Technology (IT) skills

LEADERSHIP EXPERIENCE

Chairman: Department of Pure and Applied Mathematics, School of Mathematics, Statistics and Actuarial Science, Maseno University, with effect from 2/09/2011 to May 2019

Community Service:

January 2012/2013: Board of Governors Chairman, Ngwelo Secondary School, Bungoma County

January 2016: Secretary Board of Trustees, Lugulu Yearly Meeting of Friends Church

CONFERENCES AND WORKSHOPS

1. Manyonge, A.W. : *Mathematical Modelling of the Olkaria Geothermal Reservoir*, Conference paper presented at the 14th New Zealand geothermal workshop, University of Auckland, 1992.
2. Manyonge, A. W. : *Prediction Performance of Geothermal Reservoirs Using the Concept of Deliverability*, a paper presented at the joint mathematics and physics seminar-MUC (1998), Maseno University.
3. Ronoh, K. N., Koross, A., and Manyonge, Alfred W.: 'The Vibrating Membrane Problem: A Mathematical Model for Separation Processes', paper presented at **ATSED 2011 International Conference**, 12-13th May 2011}, Eldoret Polytechnic, Eldoret, Kenya.
4. Manyonge W. A, Bitok J. K. and Kiema , W.: 'On the Steady MHD Poiseuille Flow Between Two Infinite Parallel Porous Plates in an Inclined Magnetic Field', paper presented at *ICAFD-International Conference on Application of Fluid Dynamics, 27-28th September 2012*, University of Botswana, Gaborone, Botswana. To appear in Scientific and Academic publishing, USA.
5. Manyonge W. A. : 'ICSU-Regional Implementation of Sustainable Energy in

Sub-Saharan Africa', 7-8th May 2013, Nairobi, Kenya.

6. Joshua Limo, Jacob Bitok, Alfred Manyonge: 'Hydrodynamic lubrication of a fixed incline slider bearing' 3rd International Conference on: Enhanced Utilization of Research, Science and Technology for Innovation and Sustainable Development in Africa 24th-27th May 2016 at Laikipia University -Main Campus

PUBLICATIONS

Projects:

1. Manyonge, Alfred W.: 'Mathematical Modelling of Geothermal Reservoirs: *M.Sc. Project*, University of Nairobi, 1989.
2. Manyonge, Alfred. W.: 'Mathematical Modelling of the Olkaria geothermal reservoir', Project, *Dip. Geotherm. Tech.*, Geothermal Institute, University of Auckland, 1992.

Theses:

1. Manyonge, Alfred W.: 'Mathematical Modelling of the Olkaria geothermal reservoir', *Ph.D. Thesis*, University of Nairobi, 1997.

Books:

1. *Introduction to Fluid Dynamics: A theoretical approach*: LAP LAMBERT Academic Publishing, Saarbrücken, Germany, 2013 (ISBN 978-3-659-38398-4) <https://www.lap-publishing.com/>
2. *Elementary Partial Differential Equations*: LAP LAMBERT Academic Publishing, Saarbrücken, Germany, 2013 (ISBN 978-3-659-38790-6) <https://www.lap-publishing.com/>
3. *Elementary Fluid Mechanics: A first Course*: LAP LAMBERT Academic Publishing, Saarbrücken, Germany, 2013 (ISBN 978-3-8473-4698-2) <https://www.lap-publishing.com/>
4. *Some Elements of Fluid Mechanics*: SARA BOOK PUBLICATION, Ahmedabad, India, 2015 (ISBN 9 781630 429447)
5. *Introductory Fluid Dynamics*: ASCENT PUBLICATION, India, 2017

Journal Articles Published:

1. Manyonge, Alfred W.: 'Prediction performance of geothermal reservoirs using the concept of deliverability': A paper presented at the *Joint mathematics and physics seminar-MUC*, 1998 and published in *proceedings of the 20th New Zealand geothermal workshop*, University of Auckland, November 1998.
2. Manyonge, Alfred W. & Wandera B. Ogana: 'Mathematical modeling of heat flow in porous media': A paper published in *proceedings of the 22nd New Zealand geothermal workshop*, University of Auckland, November 2000
3. Manyonge, Alfred W. & Wandera B. Ogana: 'Natural state models for geothermal systems: A case study of the Olkaria geothermal system in Kenya': A paper published in *proceedings of the 24th New Zealand geothermal workshop*, University of Auckland, New Zealand, November 2002.

4. Manyonge Alfred W., Bitok, Jacob K & Nyambane Haron: 'Irrotational Motion of a Perfect Fluid': Finite Element Solution': *Jour. of Mathematical Sciences*, Vol. 21, No. 3.(2010), 257-266.
5. Manyonge, Alfred W., Nyambane, Haron & Bitok, Jacob K.: 'Finite Difference Approximations of Confined Aquifer flow Equations': *Jour. of Mathematical Sciences*, Vol. 21, No. 3. (2010), 309-314.
6. Lawi G. Owour & Manyonge W. Alfred: '3-Dimensional Mathematical Modelling of Temperature Distribution in Porous Media': *International Journal of Pure and Applied Mathematics*, Vol. 70, No. 7. (2011), 1021-1028.
7. Manyonge W. Alfred, Iyaya C.C. Wanjala & Shichikha, J. Maremwa: 'A Note on Adomian Decomposition Method': *Jour. of Mathematical Sciences*, vol.23, No. 2(2011), 275-284.
8. Manyonge, Alfred W., Okaka, C. Akinyi & Nyambane, Haron: 'Mathematics of War: Guerilla versus Guerilla Combat': *Jour. of Mathematical Sciences*, Vol. 22, No. 1. (2011), 1-6.
9. Manyonge, Alfred W., Kiema, D. Wambua & Iyaya, C.C. Wanjala: 'Steady MHD flow Between Two Infinite Parallel Porous Plates In an Inclined Magnetic Field': *International Jour. of Pure and Applied Mathematics*, Vol. 76, No. 5.(2012), 661-668.
10. Iyaya C.C. Wanjala, Manyonge, W. Alfred & Esekoni, I. Joseph: 'On Singular Cauchy Problem of Euler-Poisson-Darboux Equation': *Pioneer Journal of Mathematics and Mathematics Sciences*, Vol. 5, issue 1 (2012), 121-136.
11. Alfred W. Manyonge, Reccab M. Ochieng, Frederick N. Onyango & Shichikha J. Maremwa:
'Mathematical Modelling of Wind Turbine in a Wind Energy Conversion System: Power Coefficient Analysis': *Jour. of Applied Mathematical Sciences*, vol. 6, No. 91(2012), 4527-4536
12. Manyonge, A.W., Shichikha, J.M., Sang, N. & Chepkwony, J. K.: 'An Estimate of Velocity Profile in Laminar Boundary Layer': *International electronic Jour. of Pure and Applied Mathematics*, Vol. 4, No. 4.(2012), 285-295.
13. M.C. Kweyu, W.A. Manyonge, A. Koross, V. Ssemaganda: 'Numerical Solutions of the Burgers' System In Two Dimensions Under Varied Initial And Boundary Conditions': *Jour. of Applied Mathematical Sciences*, vol. 6, No. 113(2012), 5603-5613.
14. Alfred W. Manyonge, Isaiah O. Odero & Julius M. Shichikha: 'Unsteady Hydromagnetic Laminar Flow Between Two Parallel Infinite Plates one Moving in the Direction of Flow'. *Pioneer Journal of Mathematics and Mathematics Sciences*, Vol. 6, issue 1 (2012), 79-93.
http://www.pspchv.com/content/_1_PJMMS_volume_6_issus-1.html
15. A. Manyonge, D. Kweyu, J. Bitok, H. Nyambane & J. Maremwa: 'Weak Solution of the Euler-Poisson- Darboux Equation for n=4': *Jour. of Applied*

- Mathematical Sciences*, vol. 7, No. 7(2013), 315-325.
16. Okiro, J., Manyonge, A. W., Ongati, O., Shichikha, J. & Kimaiyo, J.: On The Solution of Confined Aquifer Flow Equations: Finite Difference Approximations: *Jour. of Applied Mathematical Sciences*, vol. 7, No. 58(2013), 2885-2896.
 17. Ronoh, K., Manyonge, A. W. & Koross, A.: 'A Finite Differences Solution to the Vibrating Membrane Problem': *Journal of Mathematical Theory and Modelling*, Vol. 3, No.3, 2013, pp 116-127. International Institute for science, technology and education. www.iiste.org
 18. Kwach, B. O., Manyonge, A. W., Alambo, D. O. & Aminer, T.: 'Solutions of Second order Partial Differential Equations in Two Independent Variables Using Method of Characteristics: *International Jour. of Multidisciplinary Research and Engineering*, vol. 4, No. 5, June 2013, pp 21-24. www.ijmse.org. ISSN: 2045-7057.
 19. N. K. Sang, A. W. Manyonge and J. M. Shichikha,: 'An Investigation of the Effects of Boundary Layer Thickness on a Thin Film of Liquid Flow Down An Inclined Plane': *Jour. of Mathematics and Mathematical Sciences*, Vol. 8, issue 1, 2013, pp 21-33. Pioneer Scientific Publisher, ISSN: 2230-9829.
 20. P. K. Saina, A. W. Manyonge, J.K. Kimaiyo, and J. S. Maremwa: 'Modelling Stratified Flow in an Inclined Flow Channel with a Bend': *Journal of Applied Mathematics and Bioinformatics*, Vol. 3, issue 3, 2013, pp 59-73. Scienpress ltd, UK, ISSN: 1792-6602(print), 1792-6939(online).
 21. Manyonge W. A, Bitok J. K. and Kiema, W.: 'On the Steady MHD Poiseuille Flow Between Two Infinite Parallel Porous Plates in an Inclined Magnetic Field', *American Journal of Computational and Applied Mathematics*, vol. 3 issue 4, 2013, pp 220-224, Scientific and Academic Publishing, USA, e-ISSN: 2165-8943, <http://journal.sapub.org/ajcam>.
 22. Shichikha, J. M., Manyonge W. A and Bitok J. K.: 'Head Loss Analysis in Pipe Component Systems', *Applied Mathematics*, vol. 3 issue 5, 2013, pp 160-162, Scientific and Academic Publishing, USA, e-ISSN: 2163-1408, <http://journal.sapub.org/am>.
 23. Saina, P. K., Manyonge, A. W., Kimaiyo, J. K. & Maremwa. J.S.: 'Effects of Conduction and Variable Properties On a Two Dimensional Conjugate Heat Transfer of a Nanofluid in a Microchannel': *Journal of Applied Mathematics and Bioinformatics*, Vol. 3, issue 4, 2013, pp 301-322. Scienpress ltd, UK, ISSN: 1792-6602(print), 1792-6939(online).
 24. P. O. Ochieng, A. W. Manyonge & A. O. Oduor: 'Mathematical Analysis of Tip Speed Ratio of a Wind Turbine and its Effects on Power Coefficient': *International Jour. of Mathematics and Soft Computing*, vol. 4, no. 1(2014), 61-66, ISSN Print: 2249-3328, ISSN Online: 2319-5215.
 25. Okaka C. Akinyi, Mugisha, J. Y. T., Manyonge, A. & Ouma, C.: 'Modelling the Impact of Misdiagnosis and Treatment on the Dynamics Concurrent and Co-infection with Pneumonia': *Applied Mathematical Sciences*, vol. 7, no.

- 126(2013), 6275-6296, HIKARI Ltd, www.m-hikari.com
<http://dx.doi.org/10.12988/ams.2013.39521>.
26. Benjamin M. Nyamai, Jacob K. Bitok, Alfred W. Manyonge, & Cleophas M. Kweyu: `Mathematical Investigation on the Effect of Number of Branches on Water Hammer': *Advances and Applications in Fluid Mechanics*, vol. 14 issue 2 (2013), pp 255-265, Pushpa Publishing House, INDIA,
<http://pphmj.com/journals/aafm.htm>.
 27. K. Korkoren, A. W. Manyonge & J. Rading: `Mathematical Model of Variable Speed Pitch Regulated Turbine in a Wind Energy Conversion System': *American Journal of Mathematical Science and Applications*, vol. 2, no. 1(2014), 33-39, ISSN: 2321-497X.
 28. D. W. Kiema, A. W. Manyonge & J. K. Bitok: `On the Steady MHD Poiseuille Flow Between two Infinite Parallel Porous Plates': *Internal Journal of Scientific Research and Innovative Technology*, vol. 2, no. 2(2015), 100-108.
 29. Okaka C. Akinyi, Mugisha J. Y. T., Manyonge A., & Ouma C.: `A model on the Impact of Treating Typhoid with Anti-Malarial: Dynamics of Malaria Concurrent and Co-Infection with Typhoid': *International Journal of Mathematical Analysis*, vol. 9 issue 11 (2015), pp 541-551, HIKARI Ltd, www.m-hikari.com,
<http://dx.doi.org/10.12988/ijma.2015.412403>.
 30. D.W. Kiema, W.A. Manyonge, J.K. Bitok, R.K. Adenyah and J.S. Barasa: `On the steady MHD Couette flow between two infinite parallel plates in a uniform transverse magnetic field': *Journal of Applied Mathematics & Bioinformatics*, vol.5, no.1, 2015, 87-99 ISSN: 1792-6602 (print), 1792-6939 (online), Scienpress Ltd, 2015.
 31. C.C. Wanjala, A.W. Manyonge, J.K. Limo, and J. Maremwa: `On the Solution of the n Dimensional Wave equation': *International J. of Pure and Engg. Mathematics (IJPEM)*, vol.3, no.1, 2015, 235-234 ISSN: 2348-3881, Ascent Publication, 2015.
 32. C.C. Wanjala, A.W. Manyonge, J.K. Limo, and J. Maremwa: `On The Riesz-Thorin Interpolation Theorem': *Internal Journal of Pure and Engineering Mathematics (IJPEM)*, vol.3, no. II(August 2015), pp 27-32.
 - 33.] Joyce K. Nthiri, George O. Lawi and Alfred Manyonge: `Mathematical Modelling of Tuberculosis as an Opportunistic Respiratory Co-Infection in HIV/AIDS in the Presence of Protection` *Applied Mathematical Sciences*, Vol. 9, 2015, no. 105, 5215 - 5233 HIKARI Ltd, www.m-hikari.com
<http://dx.doi.org/10.12988/ams.2015.54365>
 34. Rhodah O. Esilaba, Edgar Otumba and Alfred Manyonge: `Computation of Efficient Nash Equilibria for Experimental Economic Games` *International Journal of Mathematics and Soft Computing*, Vol. 5, 2015, no. 2, 197 - 212. ISSN Print: 2249-3328. ISSN Online: 2319-5215.
 35. J.K. Limo, J. K. Bitok, A.W. Manyonge & C. C. Wanjala: `Hydrodynamic Analysis of a Fixed Incline Slider Bearing': *Internal Journal of Pure and*

- Engineering Mathematics*, Vol. 3, no. III(December, 2015), pp. 23-38. ISSN: 2348-3881.
36. Opiyo Richard Otieno, Alfred Manyonge, Owino Maurice & Ochieng Daniel: 'Finite Difference Analysis of 2-Dimensional Acoustic Wave with a Signal Function': *Internal Journal of Multidisciplinary Sciences and Engineering*, Vol. 6, no. 10(October, 2015),ISSN: 2045-7057.
 37. J.K. Limo, J. K. Bitok, A.W. Manyonge & C. C. Wanjala: 'Hydrodynamic Analysis of a Fixed Incline Slider Bearing': *Internal Journal of Pure and Engineering Mathematics*, 2015.
 38. A. W. Manyonge, R. Opiyo, D. Kweyu & J. Maremwa: 'Numerical Solution of Non-Linear Boundary Value Problems of Ordinary Differential Equations Using the Shooting Technique': *Journal of Innovative Technology and Education*, Vol.4, 2017, no. 1, 29-36, HIKARI Ltd., www.m-hikari.com <https://doi.org/10.12988/jite.2017.61250>.
 39. B. M. Nyamai, J. K. Bitok, A. W. Manyonge & J. K. Kandie: 'An Investigation of MHD Flows of Nanofluid over an Oscillating Surface with Joule Heating': *Journal of Applied Mathematics and Bioinformatics*, Vol.7, no. 1, 2017, 27-48, ISSN 1792-6602(print), 1792-6939 (online), Scienpress, Ltd. 2017.
 40. Opiyo Richard Otieno, Alfred W. Manyonge & Jacob K. Bitok: 'Numerical Computation of Steady Buoyancy Driven MHD Heat and Mass Transfer Past An Inclined Infinite Flat Plate with Sinusoidal Surface Boundary Conditions': *Journal of Applied Mathematical Sciences*, Vol.11, 2017, no. 15, 711-729, HIKARI Ltd., www.m-hikari.com <https://doi.org/10.12988/ams.2017.7127>.
 41. Opiyo Richard Otieno, Alfred W. Manyonge & Jacob K. Bitok: 'Similarity Transformation Analysis of Heat and Mass Transfer Effects On Steady Buoyancy Induced MHD Free Convection Flow Past An Inclined Surface': *Journal of Innovative Technology and Education*, Vol.4, 2017, no. 1, 83-96, HIKARI Ltd., www.m-hikari.com <https://doi.org/10.12988/jite.2017.724>.
 42. I. O. Odero, W. A. Manyonge & J. K. Bitok: 'Unsteady MHD Flow over an Infinite Porous Plate Subjected to Convective Surface Boundary Conditions': *International Journal of Contemporary Mathematical Sciences*, Vol.12, 2017, no. 1, 1-12, HIKARI Ltd., www.m-hikari.com <https://doi.org/10.12988/ijcms.2017.6849>.
 43. Odero O. Isaiah, Manyonge W. Alfred & Bitok K. Jacob: 'MHD Stokes Heat and Mass Flow Past an Infinite Permeable Plate Subjected to Convective Surface Boundary Conditions': *International Journal of Contemporary Mathematical Sciences*, Vol.12, 2017, no. 3, 139-154, HIKARI Ltd., www.m-hikari.com <https://doi.org/10.12988/ijcms.2017.713>.
 44. Seth H. W. Adams, Alfred Manyonge: 'Three Dimensional Mathematical Models for Convective Dispersive Flow of Pesticides in Porous Media': *International Journal of Engineering Science and Computing*, Vol.8, 2018, no. 6, 18437-18453, <http://ijesc.org/>

45. P. C. Koech, A. W. Manyonge and J. K. Bitok: 'The Acoustic Wave Propagation Equation: The Discontinuous Galerkin Time Domain Solution Approach'. *Applied Mathematical Sciences*, Vol. 13, 2019, no. 16, 753-767. HIKARI Ltd, www.m-hikari.com, <https://doi.org/10.12988/ams.2019.9343>.