



Dr. Mark Kimathi

Personal Details

Gender **Male.**
Nationality **Kenyan.**
Address **Machakos University.**
Department of Mathematics.
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Contact **Cell:, +254 707 823 927, Email:, memkimathi@gmail.com.**
Languages **Kimeru, English and Swahili.**

Education

2008–2012 **Doctorate, Technische Universita`t Kaiserslautern, Germany.**
Grade: Good-Cum Laude
Thesis Title *Mathematical Models for 3-Phase Traffic Flow Theory*
Supervisors Prof. Dr. Axel Klar & Prof. Dr. Reinhard Illner
Description This thesis entailed the derivation of macroscopic traffic flow models from certain microscopic and kinetic traffic flow models with the aim of describing the formation and propagation of congestion that occur on motorways in the vicinity of bottlenecks. The equations were solved using a numerical method that is implemented in MATLAB to effectively simulate the occurrence of traffic congestion at road bottlenecks.

2004–2006 **M.Sc., Applied Mathematics, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya.**
Grade: Good-Cum Laude
Thesis Title *A Modified Macroscopic Traffic Flow Model to Enhance Traffic Flow*
Supervisors Prof. Matthew Kinyanjui & Prof. Johana Sigey

Description In this thesis a macroscopic traffic model of the Payne-type was modified to accommodate the Variable Message Sign traffic control strategy. The resulting model equations were solved numerically and the simulations showed that the model was able to reduce traffic congestion on highways.

1999–2003 **B.Sc., Mathematics**, *Catholic University of Eastern Africa*, Nairobi, Kenya.
First Class Honours

Description Major: *Applied Mathematics*. Minor: *Pure Mathematics, Statistics and Computer Science*.

Experience

Leadership Experience

February **Chairman**, *Industrial and Engineering Mathematics Department*, Technical University of Kenya, 2016–August

2017 Overall Responsibilities:

- general management of the department resources and servicing mathematics units to Faculty of Engineering Science and Technology-T.U.K.

December **Chairman**, *Pure and Applied Mathematics Department*, Technical University of Kenya, 2013–

February Overall Responsibilities:

2016 general management of the resources and programmes of the department.

March **Chairman**, *Mathematics and Physical Science Department*, Dedan Kimathi University of Technology, Kenya, 2013–August

2013 Overall Responsibilities:

- general management of the resources and programmes of the department.

May **Exam Coordinator**, *Mathematics and Physical Science Department*, 2012–March Dedan Kimathi University of Technology,

2013 Kenya.

Teaching Experience

September **Senior Lecturer**, *Machakos University*, Teaching and Supervision 2017–Present Areas:

Differential Equations, Advanced Calculus, Fluid Dynamics, Numerical Methods among others.

February **Sessional Lecturer**, *Pan African University, Institute of Basic Sciences*, 2016–Present *Technology and Innovation, Kenya*, Teaching and Supervision Areas:

Computational Mathematics and Mathematical Modeling.

October **Senior Lecturer.**, *Technical University of Kenya.*, Teaching and Super2016–
August vision Areas:.

2017 Differential Equations, Advanced Calculus, Numerical Methods, Mathematical Modeling among others.

August 2013– **Lecturer.**, *Technical University of Kenya.*, Course Units Taught:.

October Differential Equations, Advanced Calculus, Numerical Methods, Mathematical
2016 Modeling among others.

May **Lecturer.**, *Dedan Kimathi University of Technology, Kenya.*, Course Units
2012–August Taught:.

2013 Differential Equations, Advanced Calculus, Vector Analysis among others.

August **Tutorial Fellow, Part-Time.**, *Jomo Kenyatta University of Agriculture and
2006–May Technology, Kenya.*, Course Units Taught:.

2008 Differential Equations, Advanced Calculus, Vector Analysis among others.

Publications

2017.

1. Onyango E.R., Kinyanjui M.N., Kimathi M. *Effects of the direction of a transverse magnetic field on unsteady MHD Couette flow with suction and injection.* International Journal of Science and Research, Vol.6, No.2, 2017.
2. Gilbert Magiboi Nalisi, Jeconia Abongo Okello, Johana Kibet Sigey, Mark Erick Mwiti Kimathi. *Unsteady MHD free convective flow past an inclined parabolic accelerated plate with Hall current, radiation effects and variable temperature in a porous medium.* International Journal of Management and Fuzzy Systems, Vol.3, No.2, 2017.
3. Onyango E.R., Kinyanjui M.N., Kimathi M. *Unsteady hydromagnetic flow between parallel plates both moving in the presence of a constant pressure gradient.* International Journal of Engineering Science and Innovative Technology, Vol.6, No.1, 2017.

2016.

1. Maithya D.M., Kimathi M., Diaraf S. *Simulation of Traffic Congestion at Unsignalised Intersections using a Microscopic Traffic Flow Model.* International Journal of Applied Mathematical Sciences, Vol.9, No.2, 2016.
2. Kariuki E., Kimathi M., Mwenda E. *Vehicular Traffic Flow Model with Driver Aggressiveness Component in a Multilane Road.* Journal of Applied and Computational Mathematics, Vol.5, No.3, 2016.

2015.

1. Onyango T.T.M., Kimathi M., and Abidha M.G. *Control Volume Method for Modeling Slightly Compressible Flow in Reservoirs,* International Journal of Mathematical Sciences and Applications, Vol.5, No.2, 2015. pp 457-463.

2. D. Kihuga, M. Kimathi, M. Kinyanjui. *Investigation of Temperature Distributions for a Finite Elasto-Hydrodynamic Journal Bearing Lubricated by Ferro Fluids with Couple Stresses*, Journal of Computations and Modeling, Vol.5, No.3, 2015. pp 81-97.
3. S.K. Mutua, M.E. Kimathi, J.K. Kwanza. *Comparison of Godunov's and Relaxation Schemes Approximation of Solutions to the Euler Equations*, Journal of Applied Mathematics and Bioinformatics, Vol.5, No.2, 2015. pp 69-83.
4. A.W. Ndegwa, M.M. Kimathi, M.N. Kinyanjui, I. Chepkwony. *Mathematical Modeling of Water Flow for Irrigation in a Permeable Pipe of Elliptical Cross-section*, British Journal of Mathematics and Computer Science, Vol.5, Issue.2, 2015. pp 159-178.

2014.

1. D. Kihuga, M. Kimathi, M. Kinyanjui. *Investigation of Pressure Distributions for a Finite Elasto-Hydrodynamic Journal Bearing Lubricated by Ferro Fluids with Couple Stresses*, American Journal of Applied and Mathematics., Vol.2, No.4, 2014. pp 135-140.
2. S.K. Mutua, M.E. Kimathi, J.K. Kwanza. *Comparison of Godunov's and Relaxation Schemes Approximation of Solutions to the Traffic Flow Equations*, International Journal of Scientific and Innovative Mathematical Research., Vol.2, Issue.9, 2014. pp 782-793.

2013.

1. R. Borsche, M. Kimathi, A. Klar. *A Class of Multi-phase Traffic Theories for Microscopic, Kinetic and Continuum Traffic Flow Models*, Communications in Mathematical Sciences, Vol.3, No.4, 2013. pp 233-237.
2. S.K. Mutua, M.E. Kimathi, P.R. Kiogora, N.M. Mutua. *A Study of Solutions to Euler Equations for a One Dimensional Unsteady Flow*, American Journal of Computational and Applied Mathematics, Vol.2, Issue.9, 2014. pp 782-793. **2012.**
1. R. Borsche, M. Kimathi, A. Klar. *A Class of Multi-phase Traffic Theories for Microscopic, Kinetic and Continuum Traffic Flow Models*, Computers and Mathematics with Applications., Vol.64, Issue 9, 2012. pp 2939-2953.
2. M.E. Kimathi. *Mathematical Models for 3-Phase Traffic Flow Theory*, Ph.D. Thesis. Technische Universita"t Kaiserslautern, Germany, 2012.

Academic Supervisions-Doctorate Level

Completed Ph.D. Supervisions.

1. A. Ndegwa. *Mathematical Modeling of Fluid Flow in a Porous Pipe of Elliptical Cross-section*, Ph.D. Thesis. Kenyatta University, Kenya, **Graduated in August 2017.**

2. M. Wainaina. *A Study on the Influence of Drag, Lift and Spin Effects on the Flight Motion of a Golf Ball.*, Ph.D. Thesis. Catholic University of Eastern Africa, Kenya, **Graduated in October 2017.**
3. A. Magua. *Simulating the Effects of Dam Breakage on the Downstream Topography: Morphological Evolution of Mounds and a Furrow*, Ph.D. Thesis. Kenyatta University, Kenya, **Graduated in December 2015.**

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Ph.D. Supervisions-Numerical Simulation.

1. W. Ndungu. *Mathematical Modeling of Multilane Traffic Flow using an Aw-Rasclé-Type Model derived from a Multilane Kinetic Model*, Ph.D. Thesis. Jomo Kenyatta University of Agriculture and Technology, Kenya, **Expected to Graduate in November 2017.**

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Ph.D. Supervisions-Model Formulation and Analysis.

1. C. Kanyiri. *Mathematical Model of Influenza-Pneumonia co-infection with drug resistance aspect and optimal control*, Ph.D. Thesis. Pan African University, Institute for Basic Sciences, Technology and Innovation, Kenya, **Expected to Graduate in 2018.**
2. F. Mbabazi. *Dynamics of within-host and between-host for Influenza A and Pneumococcal co-infection*, Ph.D. Thesis. Pan African University, Institute for Basic Sciences, Technology and Innovation, Kenya, **Expected to Graduate in 2018.**

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Ph.D. Supervisions-Proposal Successfully Defended.

1. E. R. Onyango. *Unsteady MagnetoHydrodynamic Jeffrey Hamel Flows in the presence of a variable Magnetic field and mass transfer*, Ph.D. Thesis. Jomo Kenyatta University of Agriculture and Technology, Kenya, **Expected to Graduate in November 2018.**

Academic Supervisions-Masters Level

Completed M.Sc. Supervisions.

1. S.K. Mutua. *Comparison of Godunov's and Relaxation Numerical Schemes in Solving the Euler Equations and Aw-Rasclé Traffic Flow Model*, M.Sc. Thesis. Jomo Kenyatta University of Agriculture, Kenya, **Completed in 2016.**
2. E.K. Mbaka *A Vehicular Traffic Flow Model accounting for Driver Aggressiveness on Multilane Roads*, M.Sc. Thesis. Meru University of Science and Technology, Kenya, **Completed in 2015.**

3. D. Kihuga. *Analysis of the Performance of Finite Elastohydrodynamic Journal Bearing Lubricated by Magnetic Fluid with Couple Stresses*, M.Sc. Thesis. Jomo Kenyatta University of Agriculture and Technology, Kenya, **Completed in 2014.**
4. S.M. Mungori. *One Dimensional Mathematical Model of Bed-Load Sediment Transport in Shallow Water Flows.*, M.Sc. Thesis. Catholic University of Eastern Africa, Kenya, **Completed in 2014.**
5. A.M. Gwecho. *Numerical Modeling of Single Phase Flow in Oil Reservoirs*, M.Sc. Thesis. Catholic University of Eastern Africa, Kenya, **Completed in 2014.**
6. P. Olugbenga. *Mathematical Modeling of Infectious Disease Population Dynamics: A Study of Measles in Nigeria*, M.Sc. Thesis. Catholic University of Eastern Africa, Kenya, **Completed in 2013.**

M.Sc. Supervisions-Thesis Successfully Defended.

1. D. M. Maithya. *Study of Traffic Problem in Networks: Simulation of Traffic Flow at Unsignalised Intersection*, M.Sc. Thesis. Pan African University Institute for Basic Sciences, Technology and Innovation, Kenya **Expected to Graduate in July 2017.**
2. G. W. Mbugua. *Mathematical Modelling of Viral Marketing on Twitter*, M.Sc. Thesis. Catholic University of Eastern Africa, Kenya **Expected to Graduate May 2017.**
3. A. L. Chepkorir. *Modelling Forest Fire Spread and its Boundedness*, M.Sc. Thesis. Catholic University of Eastern Africa, Kenya **Expected to Graduate in May 2017.**

M.Sc. Supervisions-Submitted for Degree Award.

1. J. N. Kamau. *Effect of variable fluid properties and thermophoresis on unsteady forced convective magnetohydrodynamics boundary layer flow over along a permeable stretching/shrinking wedge*, M.Sc. Project. Kenyatta University, Kenya **Expected to Graduate in July 2017.**
2. F. N. Kituku. *Influence of inclined magnetic field and thermophoresis on heat and mass transfer wedge flow with variable thermal conductivity*, M.Sc. Project. Kenyatta University, Kenya **Expected to Graduate in July 2017.**
3. A. M. Rwanda. *Effect of inclined magnetic field and injection on MHD boundary layer flow over a porous exponentially stretching sheet in presence of thermal radiation*, M.Sc. Project. Kenyatta University, Kenya **Expected to Graduate in July 2017.**

Conferences and Workshops

4th Strathmore International Mathematics Conference (SIMC) 2017.

1. Mbabazi F., Kimathi M. *Importance of nested models in modeling infectious diseases*. paper submitted for SIMC proceedings, 2017.
2. Kanyiri C., Kimathi M. *Analysis of a mathematical model of influenza dynamics with drug resistance aspect*. paper submitted for SIMC proceedings, 2017.

2nd Kenyatta University Workshop on Mathematical Modeling 2017.

1. Kimathi M. *Member of Organizing Committee*. 2nd Kenyatta University Workshop on Mathematical Modeling, 2017.

Awards

April 2008 DAAD scholarship for the PhD program – Mathematics in Industry and Commerce

Academic Interests

- Mathematical Modeling of Natural Phenomena in Science and Engineering
- Numerical Simulations in Mathematical Softwares e.g. MatLab