

# Dr. Henry Kasumba

## Curriculum Vitae



### PERSONAL DATA

Name Henry Kasumba  
Email kasumba123@yahoo.at  
Web <http://kasumba123.wix.com/henrykasumba>  
Date and place of birth 01.01.1981, Masaka, Uganda  
Nationality Ugandan  
Sex: Male

### EDUCATION

2007-2010 **PhD Studies (Shape Optimization in Fluids): Thesis-Optimal Shape Design Using Translation Invariant Cost Functionals in Fluid Dynamics**, *Karl-Franzens University Graz, Austria.*  
2006–2007 **MSC in Industrial Mathematics**, *Johannes Kepler University, Linz, Austria.*  
2005–2006 **MSC in Computational Science and Engineering (double degree program)**, *Technical University Eindhoven, The Netherlands.*  
2001–2004 **Bachelor of Science with Education Degree (Maths, Physics)**, *Makerere University, Kampala, Uganda.*

### PROFESSIONAL APPOINTMENT

Jan.2015– **Lecturer on a short term contract**, *Department of Mathematics, Makerere University, Uganda.*  
May.2014– **Senior Lecturer-Part time**, *Uganda Christian University, Mukono, Uganda.*  
Dec. 2015  
Jan. **Postdoctoral Research Scientist**, *Radon Institute of Computational and Applied Mathematics of the Austrian Academy of Sciences, Linz, Austria.*  
2011–March 2014

- 2007–2010 **Project collaborator in the Doctoral School-Numerical Simulation in Technical Sciences**, under collaboration of Karl-Franzens University and Technical University Graz, Austria.
- 2004-2005 **Research Assistant Department of Mathematics**, Makerere University, Kampala, Uganda. Preparation and marking of course work for the course Elements of probability and statistics (EPS 101).
- 2004-2005 **Part-time Teacher of Mathematics and Physics**, Comprehensive College Kitetiika, Kampala, Uganda.
- 2001-2004 **Short term employment at Masaka S.S.**, Tasked with teaching Mathematics and Physics to A-level students..
- 2001- **Short term employment Uganda electoral commission**, as supervisor and member of enumeration team.

## RESEARCH INTERESTS

**Shape optimization with PDE constraints, Variational inequalities, inverse problems, Free boundary problems, Computational fluid dynamics, Mathematical modelling and Scientific computing.**

## RESEARCH EXPERIENCE

### PhD. Dissertation Research

University Karl-Franzens University Graz, Austria

Title Optimal Shape Design Using Translational Invariant Cost Functionals in Fluid Dynamics

Advisor Prof. Dr. Karl. Kunisch

### Msc. Dissertation Research

University Johannes Kepler University Linz, Austria

Title Uzawa Type Methods for the Obstacle Problem

Advisor Prof. Dr. Walter.Zulehner

## TEACHING EXPERIENCE

- Jan. 2015 to — **Lecturer (Short term contract), Department of Mathematics, Makerere University**, Courses taught: *Engineering Mathematics IV, Numerical methods for PDEs (master's course), Statistical Inference, Probability Theory, Numerical Analysis II.*
- May. 2014 to Dec. 2015 **Senior Lecturer (Short term contract), Department of information Technology, Uganda Christian University, Mukono** , Courses taught: *Data Analysis, Mathematical Analysis, Single variable calculus, Numerical methods, Differential Equations, Linear Algebra, Statistical Methods .*
- Aug. 2014 to Dec.2014 **Senior Lecturer (Short term contract), Uganda Martyrs University.**, Courses: *Programming Algorithms and data structures, Fundamentals of structured programming, Discrete Mathematics.*

2004 to 2005 **Department of Mathematics, Makerere University** , *Preparation and marking of course work for the course Elements of probability and statistics.* .

## TECHNICAL SKILLS AND COMPETENCIES

Languages	C++, Matlab, MS-Visual Basic
Software	FreeFem++, FemLab, R, Splus
Operating systems	Linux, MS Windows
Computer Algebra Systems	Maple, Mathematica
Information Systems	SQL, XML-technologies
Text Processing	TeX, LaTeX, HTML related technologies

## ACADEMIC HONORS AND AWARDS

- 2007-2010 **PhD project grant: supported by Austrian Science Foundation (FWF)** .
- 04.2010 **European Science Foundation travel grant**, *Grant awarded to support academic visit to Charles University Prague, Czech Republic.*
- 2005-2007 **Erasmus-Mundus-scholarship in Industrial and Applied mathematics**, *Offered by European-Union to study a joint masters degree in Industrial and Applied Mathematics at TU-Eindhoven, The Netherlands and Johannes-Kepler University-Linz-Austria .*
- 2004-2005 **The East African Universities Mathematics Programme (EAUMP)-scholarship**, *Offered to study master of Mathematics at Makerere-University-Uganda .*

## PUBLICATIONS

### Refereed journals

- (8) H. KASUMBA, K KUNISCH, AND A. LAURAIN, A Bilevel shape optimization problem for the exterior Bernoulli free boundary problem **Interfaces and Free boundaries**, Volume 16, Issue 4, 2014, pp. 459–487 DOI: 10.4171/IFB/326.
- (7) H. KASUMBA, Shape optimization approaches to free surface problems. **International Journal of Numerical Methods in Fluids**, Volume 74, Number 11 (2014), 818-845.
- (6) H. KASUMBA and K. KUNISCH, On computation of shape Hessian of the cost functional without shape sensitivity of the state variable. **Journal of Optimization theory and Appl.**, Volume 162, Issue 3(2014), pp 779-804.
- (5) E. F. CARA ,T. HORSINY and H. KASUMBA, Some inverse and control problems for fluids. **Annales mathématiques Blaise Pascal** 20 no. 1 (2013), p. 101-138.
- (4) H. KASUMBA and K. KUNISCH, Vortex control of instationary channel flows using translation invariant cost functionals. **Computational Optimization and Applications** (2013) 55:227-263
- (3) H. KASUMBA and K. KUNISCH, On a free surface PDE constrained shape optimization problem.

**Applied Mathematics and Computation 218 (2012) pp. 11429–11450**

- (2) H. KASUMBA and K. KUNISCH, Vortex control in channel flows using translation invariant cost functionals. **Computational Optimization and Applications, Volume 52, Number 3 (2012), 691-717.**
- (1) H. KASUMBA and K. KUNISCH, On shape sensitivity analysis of the cost functional without shape sensitivity of the state variable. **Control and Cybernetics Vol 40(4) (2011) Pages- 989-1017.**

### Refereed conference proceedings

1. H. KASUMBA and K. KUNISCH, Shape design optimization for viscous flows in open channel with a bump and an obstacle. *Methods and Models in Automation and Robotics* (2010), 284-289 doi: 10.1109/MMAR.2010.5587219.

### Submitted

- H. KASUMBA, A. Laurain, Boundary Control of A Bernoulli Free boundary Problem.(submitted to: *Siam Journal of Scientific Computing* (2013))
- H. KASUMBA, Shape derivative a Kohn-Vogelius Like cost functional for inverse identification problem. (submitted to: *Journal of Mathematical Analysis and Appl.*(2013))

### In preparation (with K. KUNISCH, A. LAURAIN)

- Shape optimization approaches to 3-D free surface problems.
- Boundary Control of a Stokes Free boundary Problem.
- A second order fixed domain approach to a shape optimization problem.

### TECHNICAL REPORTS

- Henry Kasumba, Stephen L. Keeling, Markus Müller, Decay estimate addendum to: Revision of the theory of tracer transport and convolution model of DCE-MRI. SFB-Report 2010-022. A copy is accessible at [http://math.uni-graz.at/invcon/medimage/kernell\\_ad.pdf](http://math.uni-graz.at/invcon/medimage/kernell_ad.pdf)
- Henry Kasumba, Tefa Kaisara, Vidar Hrafnkelsson, Konstantin Lofink , Joanna Sylvia Pelc, Yayun Zhou, Ute Ziegler. *Mathematical Models for a Fishing Rod and the Action of Casting with a Bait.* ECMI modelling week report Copy available at <http://www2.mat.dtu.dk/people/M.P.Soerensen/ModellingWeek/team5.pdf>
- Effects of gravity on contrast agent dispersion in blood vessels, Modeling Week Report -TU Eindhoven. March 2007.

### SHORT TERM SCIENTIFIC VISITS

- 04.2010: Invitation from Prof. Jaroslav Haslinger. Charles University in Prague, Czech Republic, Faculty of Mathematics and Physics
- 11.2009: Invitation from Prof. Boris Vexler. Technical University Munich, Center for Mathematical Sciences, Munich, Germany.

### PARTICIPATION AT CONFERENCES, WORKSHOPS, COURSES

1. 6th IFIP TC7 Conference 2013 on System Modelling and Optimization, Institute of Mathematics, Alpen-Adria Universität Klagenfurt, Austria, Sept. 2013.
2. Conference on Domain Decomposition Methods for Optimization with PDE Constraints, Monte Verita, Ascona, Switzerland, Sept. 2013.
3. International colloquium in Trends in optimization and optimal control. Graz- Austria, Sept. 2012.

4. 41st National Congress of Numerical Analysis (CANUM 2012) Super-Besse, Belambra- France,21-25 May 2012.
5. Workshop on Numerical Methods for Optimal Control and Inverse Problems, March 12-14, 2012. Technische Universität München, Faculty of Mathematics Garching by Munich-Germany.
6. International Workshop on Control and Optimization of PDEs, 10-14 October 2011. Mariatrost - Graz, Austria.
7. 15th Austrian-French-German Conference on Optimization,19-23 September 2011. 1, place Emile Blouin - Toulouse, France
8. 15th International Conference on Methods and Models in Automation and Robotics 23-26 August 2010. Amber Baltic Hotel, Miedzzydroje, Poland.
9. Workshop on first tutorial on freefem++ Pde solver. Institut Henri Poincarè (IHP) Paris-France. September 14-15, 2009.
10. Workshop on Nonlinear PDE and Free Boundary Problems. Mathematics Institute, University of Warwick, Coventry, United Kingdom. June 15-19, 2009.
11. International Workshop on Advances in Shape and Topology Optimization, University of Graz, Austria, September 25-27, 2008.
12. Participant in Mathematics for Industry modeling week, Technical University of Eindhoven, The Netherlands. March 26th - April 4th 2007.
13. Participant in 20th ECMI modeling week, Technical University of Denmark Lyngby Denmark. August 13th - 24th 2006.
14. Participant on 2nd course on basic discrete combinatorial mathematics 30th May -10th June 2005. Nairobi Kenya.
15. Participant of the third Eastern Africa workshop on algebra, geometry and combinatorics, 19th-30th, Jan, 2005, Kampala, Uganda.

## Reviews

Reviews for **ESAIM: Mathematical Modelling and Numerical Analysis.**  
**Math Reviews.**  
**Journal Mathematics (ISSN 2227-7390) .**  
**Applied Mathematics and Computation .**

## References

Prof. Karl Kunisch  
 Head Institute for Mathematics and Scientific Computing,  
 University of Graz, Heinrichstr. 36, A-8010 Graz, Austria,  
 email : karl.kunisch@uni-graz.at

Dr. Vincent. A. Ssematya  
 Director Quality Assurance, Makerere University,  
 P.O. Box. 7062, Kampala, Uganda.  
 email : vas@qad.mak.ac.ug

Ass. Prof. John Bbaale,  
 Dean School of Economics,  
 College of Business and Management Sciences,

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