

# Indika Gayani Kumari Udagedara

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## Education

- 2014 - 2017    Ph.D. in (Applied) Mathematics**  
**Clarkson University, Potsdam, NY, USA**  
G.P.A - 4.00  
Thesis topic - Reduced Order Modeling for Monte Carlo Simulations in Radiation Transport  
Advisor - Prof. Brian Helenbrook, Paynter-Krigman Endowed Professor in Engineering Science Simulation,  
Department and Mechanical and Aeronautical Engineering, Clarkson University
- 2012 - 2014    M.Sc. in Mathematics**  
**Clarkson University, Potsdam, NY, USA**
- 2010 - 2011    M.Sc. in Financial Market Analysis**  
**School of Physics, Astronomy and Mathematics, University of Hertfordshire, Hatfield, UK**
- 2004 - 2008    B.Sc. (hons) in Special in Mathematics**  
**Faculty of Science, University of Peradeniya, Sri Lanka**

## Employment

- July 2019 - Present    Senior Lecturer**  
Department of Mathematics, University of Peradeniya
- July 2019 - Present    Visiting Lecturer**  
PGIS, University of Peradeniya
- August 2017 - July 2019    Adjunct Assistant Professor**  
Department of Mathematics, Clarkson University
- January 2018 - July 2018    Postdoctoral Research Associate**  
Department of Mechanical and Aeronautical Engineering, Clarkson University
- 2012 - 2017    Graduate Teaching/ Research Assistant**  
Department of Mathematics, Clarkson University
- 2009 - 2010    Lecturer**  
Department of Mathematics, University of Peradeniya, Sri Lanka
- 2008 - 2009    Teaching Assistant**  
Department of Mathematics, University of Peradeniya, Sri Lanka

## Teaching Experience

- Senior Lecturer**  
Fluid Dynamics - I and II (MT 310, MT 406)  
Mathematical Methods (MT 204)
- Adjunct Assistant Professor**  
Summer 2019 -Applied Linear Algebra (MA 339)

Department of Mathematics, Clarkson University

Spring 2019 - Probability & Statistics (STAT 383)  
Spring 2019 - Applied Linear Algebra (MA 339)  
Department of Mathematics, Clarkson University

Fall 2018 - Applied Linear Algebra (MA 339)  
Fall 2018 - Springboard Calculus (A math refresher)  
Department of Mathematics, Clarkson University

Spring 2018 - Applied Linear Algebra (MA 339)  
Department of Mathematics, Clarkson University

Fall 2017 - Applied Linear Algebra (MA 339)  
Fall 2017 - Calculus -I (MA131)  
Fall 2017 - Basic Calculus (MA181)  
Department of Mathematics, Clarkson University

**Instructor** Spring 2017 - (Lab Instructor) Bio Statistics (STAT 318)  
Fall 2016 - Co - Calculus I (MA 41)  
Fall 2015 - Co - Calculus I (MA 41)  
Spring 2015 - Co - Calculus II (MA 42)  
Fall 2014 - Co - Calculus I (MA 41)  
Department of Mathematics, Clarkson University

**Teaching Assistant** Spring 2017- Introduction to Mathematical Programming and Software  
Spring 2016- Calculus - II (MA 132)  
Fall 2013-Calculus - I (MA 131)  
Spring 2013- Differential Equations (MA 232)  
Fall 2012 -Calculus - I (MA 131)  
Department of Mathematics, Clarkson University

**Lecturer** 2009-2010- Groups, Rings, and Fields,  
Mathematics for Computational Management I, II  
Mathematics for Biology students (Foundation course)  
Department of Mathematics, Faculty of Science, University of Peradeniya, Sri Lanka

**Teaching Assistant** 2008-2009 - Real analysis  
Groups, Rings, and Fields,  
Mathematics for Computational Management I, II  
Department of Mathematics, Faculty of Science, University of Peradeniya, Sri Lanka

## Research Experience

### Ongoing Projects

Project: Fluid particle modeling using proper orthogonal decomposition based reduced order modeling

#### Collaborators:

Prof. Brian Helenbook, Department of Mechanical and Aeronautical Engineering, Clarkson University

MSc Project: Particle transport through porous media

BSc Project: Fluid flow modeling through a porous tube

BSc Project: Weather Forecasting using dynamic mode decomposition

### January 2018 - June 2018

Postdoc Research Associate, Department of Mathematics, Clarkson University

Project: Instability Analysis of Poiseuille flow in a fluid-porous system

#### Collaborators:

Prof. Parisa Mirbod, Department of Mechanical Engineering, University of Illinois, Chicago

- 2014 - 2017** Project: Stochastic formulation of reduced order modeling for radiation transport  
Project: Radiation Source Identification and localization by Reduced Order Modeling  
**Collaborators:**  
Prof. Brian Helenbrook, Department of Mechanical and Aeronautical Engineering, Clarkson University  
Dr. Aaron Luttmann, Senior Scientist, National Security Technologies, Nevada, USA
- Spring 2014** Research Assistant, Department of Mathematics, Clarkson University  
Work done with the U.S. Department of Energy under Contract No. DE-AC52-06NA25946 and supported by the Site-Directed Research and Development Program, National Security Technologies  
Project: Reduced order modeling to accelerate Monte Carlo simulations in radiation transport  
**Collaborators:**  
Prof. Brian Helenbrook, Department of Mechanical and Aeronautical Engineering, Clarkson University  
Dr. Aaron Luttmann, Senior Scientist, National Security Technologies, Nevada, USA  
Dr. Stephen Mitchell, Senior Principal Scientist, National Security Technologies, Nevada, USA

## Research Interests

- Numerical Methods & Optimization
- Reduced Order Modeling (Dimension Reduction Techniques)
- Fluid Mechanics & Computational Fluid Dynamics
- Stochastic Processes, Bayesian Statistics and Data Science
- Uncertainty Quantification
- Image Processing

## Journal Publications

- **Udagedara, I.**, Mirbod, P. (2018), "On the Analysis of the Drag Reduction of Particle-laden Liquids Over Porous Media", *in review (Journal of Fluid Mechanics)*
- **Udagedara, I.**, Helenbrook, B., Luttmann, A. (2018), "Probabilistic Reduced Order Modeling using a Bayesian Approach", *American Journal of Mathematical and Computational Sciences*, 50-61.  
<https://arxiv.org/pdf/1702.01236.pdf>
- **Udagedara, I.**, Helenbrook, B., Luttmann, A., & Mitchell, S. E. (2015). "Reduced Order Modeling for Accelerated Monte Carlo Simulations in Radiation Transport", *Applied Mathematics and Computation*, 267, 237-251.
- Aaron Luttmann, Brian Helenbrook, **Indika Udagedara**, Stephen Mitchell, & Michael Fowler. "Reduced Order Modeling for Real-Time Monte Carlo Simulations with Applications to Radiation Detection", *Computational & Information Sciences*, Site-Directed Research & Development, FY 2014, 183-192.
- Aaron Luttmann, Marylisa Howard, Jared Catenacci, Kevin Joyse, Jonathan Bardsley, Jesse Adams, Matti Morzfeld, Brian Helenbrook, and **Indika Udagedara**, "Quantifying Uncertainties Through Advanced Theoretical Analysis for Image and Signal Reconstruction" *Computational & Information Sciences*, Site-Directed Research & Development, FY 2016, 155-164.
- **Udagedara, I.**, Helenbrook, B., "Incompressible, Axisymmetric, Unsteady, Oscillatory Flow Simulations around a Spherical Particle using Proper Orthogonal Decomposition Based Reduced Order Modeling", *reviewing for submission...*
- **Udagedara, I.**, Helenbrook, B., Luttmann, A., "Radiation Source Identification and Localization by Reduced Order Modeling", *reviewing for submission...*
- **U.G.I.G.K. Udagedara** & W.B. Daundasekara, "An application of Stochastic Linear Programming in Textile Industry", *Peredaniya University Research Sessions*, 2008, "Published as an abstract version"

## Abstracts /Conferences

- **Udagedara, I.**, Mirbod, P., *"On the Analysis of the Drag Reduction of Particle-laden Liquids over Porous Media "*, Bulletin of the American Physical Society, 2018
- **Udagedara, I.**, Mirbod, P., *"Instability Analysis of Poiseuille Flow of Suspensions Overlying Porous Media "*, InterPore 2018, New Orleans
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Improved Probabilistic Principal Component Analysis for Application to Reduced Order Modeling "*, SIAM CSE, Atlanta, Georgia, February 27 - March 3, 2017
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Improved Probabilistic Principal Component Analysis for Application to Reduced Order Modeling "*, Joint Mathematics Meetings, Atlanta, Georgia, January 4-7, 2017
- **Udagedara, I.**, *"Proper Orthogonal Decomposition based Reduced Order Modeling "*, SIAM Clarkson chapter seminar, Clarkson University, Potsdam, NY, February 2016
- Luttman, A.,**Udagedara, I.**, Helenbrook, B., *"A Statistical Formulation for Reduced Order Modeling in Radiation Transport"*, ESCO2016, Main Themes (2016): 160
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Probabilistic Analysis to Radiation Transport "*, Grad Symposium, Clarkson University, Potsdam, NY, September 29, 2015
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Probabilistic Analysis to Monte Carlo Simulation in Radiation Transport "*, Bayesian Inference and Maximum Entropy methods in science and engineering, Clarkson University, Potsdam, NY, July 19-24, 2015
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Reduced Order Modeling for Monte Carlo Simulations in Radiation Transport "*, Montana Uncertainty Quantification, Missoula, Montana, June 24 - 26, 2015
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Proper Orthogonal Decomposition based Reduced Order Modeling for Monte Carlo Simulations in Radiation Transport "*, SIAM computational science and engineering, Salt lake city, Utah, March 14- 18, 2015
- **Udagedara, I.**, Helenbrook, B., Luttman, A., *"Proper Orthogonal Decomposition based Reduced Order Modeling for Real Time Monte Carlo Simulations in Radiation Transport"*, Grad Symposium, Clarkson University, Potsdam, NY, December 17, 2014

## Computer skills

- **Programming (C++, MATLAB, Python )**
- **Software ( Mathematica, Maple, SPSS )**
- **Expert user of Latex, Latex beamer, Microsoft word, excel, and PowerPoint**
- **Ability to handle Unix shell to run parallel computing in Orion**

## Scholarships & Awards

- Teaching Assistant Scholarship at Mathematics Department, Clarkson University Fall 2012- Spring 2017
- Research Assistant Scholarship at Mathematics Department, Clarkson University Spring 2013
- Recipient of SIAM student travel award for SIAM conference on computational science and engineering 2017
- Recipient of JMM student travel award for Joint Mathematics Meetings 2017
- Recipient of SIAM student travel award for SIAM conference on computational science and engineering 2015

## Related Experience

- Contributed to redesigning the workbook, topics, and the syllabus for Springboard Calculus course (A math refresher), Clarkson University, Fall 2018
- Participated in the webinar on Interactive Figures for Linear Algebra organized by Pearson, October 2018
- Attended the Terra Northern Regional Science and Engineering Fair, NY as a junior level fair judge, March 11, 2017
- Participated in the Associated Colleges of St. Lawrence County Annual Teaching Effectiveness Conference, Potsdam, NY, November 2016