Rujeko Chinomona

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Education

Southern Methodist University (SMU) *May 2021*
Ph.D. in Computational & Applied Mathematics
Dissertation: High-Order, Flexible Multirate Integrators for Multiphysics Applications

Rice University *May 2016*
M.A. in Computational & Applied Mathematics
Thesis: Black-oil Simulation Utilizing a Central Finite Volume Scheme

Georgia College & State University *May 2014*
B.S. in Mathematics & Physics

Research Experience

Temple University Mathematics Department July 2021 - Present
Research Assistant Professor

- Expanding functionality and flexibility of the StaRMAP (Staggered grid Radiation Moment Approximation) software for solving spherical harmonic moment systems of radiative transfer.
- Implementing efficient numerical methods and exploring high-performance computing options for the Neuro-Visor project (real-time interactive signal processing in neurons with VR capabilities).

SMU Mathematics Department January 2018 - May 2021
Research Assistant

- Developed new flexible and high-order numerical algorithms for multirate time integration to be used in multiphysics applications.

Lawrence Livermore National Laboratory June 2020 - August 2020
Computing Intern

- Extended the MRIStep module within ARKode/SUNDIALS (a widely used open-source scientific computing software package developed at LLNL) by implementing recently developed multirate time integration techniques.
- Ran performance tests of new implementation on spatially serial and parallel test problems.

Lawrence Livermore National Laboratory June 2019 - August 2019
Computing Intern

- Implemented multirate time stepping in an application problem in cloud microphysics.

University of Wisconsin-Madison May 2013 - July 2013
Research Assistant

- NSF funded REU in Analysis and Differential Equations.

Georgia College & State University August 2012 - May 2014
Research Assistant

- Worked in an atomic, molecular, optics lab; designing and constructing components of a cost effective setup for laser cooling experiments.

Teaching Experience

Instructor

Mathematical Modeling & Simulation *(Temple University)* Spring 2022
Calculus II *(Temple University)* Fall 2021

Teaching Assistant

Introduction to Scientific Computing *(SMU)* Fall 2017 - Spring 2018
Pre-Calculus *(Georgia College & State University)* Spring 2014
Introductory Physics Lab *(Georgia College & State University)* Spring 2012 - Fall 2013

Grader

Matrix Analysis *(Rice University)* Fall 2014 - Fall 2015

Numerical PDEs *(Rice University)* Spring 2016

Curriculum Development

Temple University's MATH 2121

- Organized and taught the first MATH 2121 course (adapted from previous course "SCTC 2100. Topics in Science and Technology: Modeling and Simulation in Science and Technology")
- Created video lectures geared towards self-directed learning and a flipped classroom experience.

Publications

- D.R. Reynolds, D.J. Gardner, C.S. Woodward, **R. Chinomona**. *ARKODE: A flexible IVP solver infrastructure for one-step methods*. (Submitted)
- V.T. Luan, **R. Chinomona**, D.R. Reynolds. *Multirate Exponential Rosenbrock Methods*. (Submitted)
- **R. Chinomona**, D.R. Reynolds. *Implicit-Explicit Multirate Infinitesimal GARK Methods*. SIAM Journal on Scientific Computing 43, A3082–A3113. (2021)
- V.T. Luan, **R. Chinomona**, D.R. Reynolds. *A New Class of High-Order Methods for Multirate Differential Equations*. SIAM Journal on Scientific Computing 42, A1245-A1268. (2020)
- **R. Chinomona**, J. Lajeunesse, W. H. Mitchell, Y. Yao, and S.E. Spagnolie. *Stability and Dynamics of Magnetocapillary Interactions.* Soft Matter, 11:1828–1838. (2015)

Presentations

- *Derivation of stability optimized IMEX-MRI-GARK methods*, 2nd International Conference on Computational Methods and Applications in Engineering, May 2022 (virtual talk)
- *Multirate IMEX Integrators for PDEs*, ICERM Topical Workshop: Holistic Design of Time-Dependent PDE Discretizations, January 2022 (virtual lightning talk)
- *Flexible and accurate multirate time-stepping methods for differential equations*, Applied Mathematics and Scientific Computing Seminar, Temple University, September 2021 (virtual talk)
- *Highly Accurate and Flexible Multirate Time-Stepping Methods for Multiphysics Applications*, SIAM Annual Meeting, July 2021 (virtual talk)
- *High-Order Implicit–Explicit Multirate Infinitesimal Methods for Multiphysics Applications*, SIAM CSE, March 2021 (virtual talk).
- *Construction of High-Order Multirate IMEX Integrators for Large-Scale Complex Multiphysics Applications*, SIAM PP20, February 2020 (poster).
- *Comparison of High-Order Multirate Integrators*, SIAM TX-LA Section Meeting, November 2019 (poster).
- *Multirate Time Integration for Cloud Microphysics*, Lawrence Livermore National Laboratory, August 2019 (poster)
- *A New Class of High-Order Multirate Integrators for Multiphysics Applications*, SMU Research Day, March 2019 (poster).
- *A New Class of High-order, Flexible, IMEX Multirate Integrators for Multiphysics Applications*, SIAM CSE, February 2019 (talk).

Software

Neuro-VISOR v2.0.0

Computational neuroscience simulations with virtual reality visualization and real-time interaction.

M. Bennett, **R. Chinomona**, C. Fox, J. Rosado, J. Wells, N. Williams, W. Zheng April 2022

`https://github.com/c2m2/Neuro-VISOR/releases/tag/v2.0.0`

Technical Skills

Programming: Proficient in Matlab, C. Experience with C++, Python, MPI, Fortran 90, OpenMP, CUDA.

Honors & Awards

Postdoctoral Teaching Award — Spring 2022
Presented by Temple Dept. of Mathematics.

Honored Guest Speaker — April 2022
Georgia College Dept. of Mathematics Spring 2022 Award Ceremony.

SMU Dean's Dissertation Fellowship — August 2020 - May 2021
Awarded to Ph.D. candidates in their dissertation-writing phase.

Haberman Fellowship — August 2020 - May 2021
Awarded to top Ph.D. students within the Mathematics Department at SMU.

SMU University Ph.D. Fellowship — August 2017 - May 2021
Awarded to supplement stipends of outstanding Ph.D. students over the course of their programs.

Exceptional graduating senior in STEM majors at Georgia College & State University — May 2014

Philanthropic Ventures Foundation Grace Scholarship — August 2010 - May 2014

Other Activities & Service

COMAP Interdisciplinary Contest in Modeling, Judge — March 2022

Math Graduate Student Seminar, Organizer — January 2020 - December 2020

Graduate Student Assembly, Mathematics Dept. Representative — January 2020 - May 2021

SMU Ph.D. Student Health Insurance Advisory Committee Member — March 2019

Judge at Dallas Regional Science & Engineering Fair — February 2019, February 2020

Treasurer of Rice University SIAM Student Chapter — August 2015 - May 2016

Payroll Student Assistant — August 2011 - May 2014

Last updated June 2022.