Abhinandan Chowdhury, Ph.D.

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ResearcherID

Current Affiliation

2020 – · · · · ◇ **Associate Professor**, Dept. of Mathematics, Savannah State University, Savannah, GA.
2015 – 2020 ◇ **Assistant Professor**, Dept. of Mathematics, Savannah State University, Savannah, GA.
2022 – · · · · ◇ **Coordinator** of BS in Data Analytics, Savannah State University, Savannah, GA.
2016 – · · · · ◇ **Associate Graduate Faculty**, Savannah State University, Savannah, GA.
2018 – 2020 ◇ **Graduate Coordinator** of MS in Mathematics, Savannah State University, Savannah, GA.

Education

2006 – 2010 ◇ **Ph.D.**, Mathematics, University of Louisiana at Lafayette, LA.
Supervisor: Prof Christo Christov
Modeling the Microstructure of the Temperature Field and the Effective Properties of Heat Conduction through Polydisperse Spherical Suspensions.
2004 – 2005 ◇ **M.S.,** Mathematics, University of Louisiana at Lafayette, LA.
1998 – 2002 ◇ **B.E.**, Mechanical Engineering, National Institute of Technology, Rourkela, India.

Research Interests

Theory and computation of transport phenomena, Computational fluid dynamics, Nonlinear wave phenomena, Machine Learning, Artificial Neural Network.

Grants & Funding

- **PI**: *Targeted Infusion Project in Interdisciplinary Data Analytics* – (TIP-IDA). Award Period: 05/2017 to 04/2023; Funding: **NSF-HBCU-UP - 1719514**; Award Amount: $ 478,895.
- **PI**: *Identification of Effective Heat Conductivity Coefficient of Particulate Two-phase Materials*. Award Period: 05/2018 to 04/2023; Funding: **NSF Catalyst Project - 1800798**; Award Amount: $ 175,079.
- **PI-Sub-Award**: *Evaluating Bias in Predictive and Explainable* ML *Algorithms Among Older Adults with Cancer*. Award Period: 09/2022 to 02/2024; Funding: **AI/ML Consortium to Advance Health Equity and Researcher Diversity** (AIM-AHEAD); PI: Suman Niranjan (University of North Texas).; Total Award Amount: $ 912,157.
- **PI-Sub-Award**: AIM-AHEAD *Resource Center of Excellence at the University of Houston* (UH) *for Data Curation, Linkages, and Harmonization of Datasets*. Award Period: 09/2023 to 09/2024; Funding: **AI/ML Consortium to Advance Health Equity and Researcher Diversity** (AIM-AHEAD); PI: Ioannis Kakadiaris (University of Houston).; Obligated Award Amount to SSU: $ 14,210.
- **Data Analyst**: *Enhancing Career Development of* HBCU *Biomedical Researchers: Extended Training in Grantsmanship and Mentoring*. Award Period: 09/2020 to 08/2025; Funding: **NIH-DPC**; PI: Chellu Chetty (SSU); Award Amount: $ 940,035 (**Active**).
- **Senior Personnel**: *Creating Access to Modeling and Simulation Education for Minorities and Women*. Award Period: 1/2022 – 12/2025; Funding: **Department of Education**; PI: Asad Yousuf (SSU); Award Amount: $ 830,765 (**Active**).

Research Publications

I have **16 publications** in international peer-reviewed journals. My **h-index = 9, i10-index = 9**, and **total citations = 227** (as per Google Scholar Citations). †/‡ denotes undergraduate/graduate researchers advised at the time.

Journal Articles

1. Kang, D.-W., S. Zhou, R. Torres, **A. Chowdhury**, S. Niranjan, A. Rogers, and C. Shen (2024). "Predicting Serious Postoperative Complications and Evaluating Racial Fairness in Machine Learning Algorithms for Metabolic and Bariatric Surgery." *Surgery for Obesity and Related Diseases.* DOI: https://doi.org/10.1016/j.soard.2024.08.008.

2. Degon‡, L. and **A. Chowdhury** (2022). "Approximate Solutions to the Gardner Equation by Spectral modified Exponential Time Differencing Method." *Partial Differential Equations in Applied Mathematics.* **5**, p. 100310. DOI: https://doi.org/10.1016/j.padiff.2022.100310.

3. Bhatt, H. and **A. Chowdhury** (2020). "A High-order Implicit–explicit Runge–Kutta type Scheme for the Numerical Solution of the Kuramoto–Sivashinsky Equation." *International Journal of Computer Mathematics.* **90** (6), pp. 1254–1273. DOI: 10.1080/00207160.2020.1814262.

4. Bhatt, H. and **A. Chowdhury** (2019). "Comparative Analysis of Numerical Methods for the Multidimensional Brusselator System." *Open Journal of Mathematical Sciences.* **3**, pp. 262–272. DOI: 10.30538/oms2019.0069.

5. Clayton†, S., M. Lemma, and **A. Chowdhury** (2019). "Numerical Solutions of Nonlinear Ordinary Differential Equations by Using Adaptive Runge-Kutta Method." *Journal of Advances in Mathematics.* **16**, pp. 147–154.

6. Manukure, S., **A. Chowdhury**, and Y. Zhou (2019). "Complexiton Solutions to the Asymmetric Nizhnik-Novikov-Veselov Equation." *International Journal of Modern Physics B.* **33**, p. 1950098. DOI: https://doi.org/10.1142/S021797921950098X.

7. **Chowdhury**, **A.** and M. Delcambre (2017). "A Semi-analytical Approach to Determine the Velocity Potential Around Two Spheres in Arbitrary Motion Through an Ideal Fluid." *Neural, Parallel and Scientific Computations.* **25**, pp. 195–212.

8. **Chowdhury**, **A.** (2015). "A Numerical Study of the Perturbation of a Gradient Temperature Field for Arbitrary Proximity Between Two Spheres Using Legendre Spectral Method." *Romanian Journal of Physics.* **60** (3-4), pp. 401–414.

9. Kohl, R., R. Tinaztepe, and **A. Chowdhury** (2014). "Soliton Perturbation Theory of Biswas-Milovic Equation." *OPTIK - International Journal for Light and Electron Optics.* **125** (8), pp. 1926–1936. DOI: http://dx.doi.org/10.1016/j.ijleo.2013.09.074.

10. Suarez, P. and **A. Chowdhury** (2014). "On the Stochastic Burgers Equation with Moving Boundary." *Romanian Journal of Physics.* **59** (5-6), pp. 466–475.

11. Triki, H., **A. Chowdhury**, and A. Biswas (2013). "Solitary Wave and Shock Wave Solutions of the Variants of Boussinesq Equations." *University Politechnica of Bucharest: Scientific Bulletin: Series A; Applied Mathematics and Physics.* **75** (4), pp. 39–52.

12. **Chowdhury**, **A.** and A. Biswas (2012). "Singular Solitons and Numerical Analysis of Phi–four Equation." *Mathematical Sciences.* **6** (42). URL: https://link.springer.com/article/10.1186/2251-7456-6-42#citeas.

13. Morris‡, R., A. H. Kara, **A. Chowdhury**, and A. Biswas (2012). "Soliton Solutions, Conservation Laws and Reductions of certain classes of Nonlinear Wave Equations." *Zeitschrift für Naturforschung A.* **67a** (10-11), pp. 613–620. DOI: 10.5560/ZNA.2012-0071.

14. **Chowdhury**, **A.** and C. Christov (2010a). "Fast Legendre Spectral Method for Computing the Perturbation of a Gradient Temperature Field in an Unbounded Region due to the Presence of Two

Spheres." *Numerical Methods for Partial Differential Equations.* **26** (5), pp. 1125–1145. DOI: doi:10.1002/num.20479.

15 **Chowdhury**, **A.** and C. Christov (2010b). "Memory Effects for the Heat Conductivity of Random Suspensions of Spheres." *Proceedings of the Royal Society A.* **466**, pp. 3253–3273. DOI: doi:10.1098/rspa.2010.0133.

16 **Chowdhury**, **A.** and C. Christov (2010c). "On the Application of Random-Point Approximation to the Second-order Approximation for Effective Diffusivity Coefficient of Polydisperse Spherical Suspensions." *Communications in Applied Analysis.* **14**, pp. 355–372.

Book Chapters

1 Velazquez, A. and **A. Chowdhury** (2023). *Aeroelastic parameters of cable suspended bridges via Computational Fluid Dynamics.* Vol. 2953. Albena, Bulgaria, p. 070001. DOI: https://doi.org/10.1063/5.0177721.

2 Simmonds, D. and **A. Chowdhury** (2022). *Identifying the Approach to Movie Reviews using Natural Language Processing.* Vol. 2522. Albena, Bulgaria, p. 030001. DOI: https://doi.org/10.1063/5.0100834.

Conference Proceedings

1 Velazquez, A., F. Delgadillo†, V. Iwule†, S. Andreou, A. Yousuf, and **A. Chowdhury** (2024). "System Identification of Turbomachinery Sensor Signals via Machine Learning Classification and Batch Regressive Least-Squares". *IEEE SoutheastCon-2024*. Atlanta, USA. DOI: 10.1109/SoutheastCon52093.2024.10500059.

2 **Chowdhury**, **A.** and C. Christov (2009). "Perturbation of Linear Temperature Field in an Unbounded Region due to the Presence of Two Closely Situated Spheres." *In: Proceedings of the 8th International Congress on Thermal Stresses,* (TS2009). Vol. I. IL, USA, pp. 109–112.

MS Thesis Advised

Direct Supervisor @ Savannah State University

Defense/Graduation: Spring 2024 ◇ Wynter Sanderlin; *Numerical Analysis of Rosenau-KdV Equation by Fourier Spectral Methods.* Department of Mathematics.

Defense/Graduation: Spring 2023 ◇ Kayla Jones; *Building an Optimized Stock Portfolio Using Machine Learning Models.* Department of Mathematics.

Defense/Graduation: Fall 2021 ◇ Leo Degon; *Approximate Solutions to the Gardner Equation by Spectral Modified Exponential Time Differencing Method.* Department of Mathematics.

Served as Thesis Defense Committee Member

Defense: Summer 2013 ◇ Yingxue Zhao; *Numerical Methods for Solving Cold-Fluid Maxwell's Equations with Applications to the Second Harmonic Generation from Metallic Nanoparticles.* Major Professor: Jinjie Liu, Department of Mathematical Sciences, Delaware State University.

Defense: Spring 2013 ◇ Polina Razborova; *Perturbation of Dispersive Shallow Water Waves.* Major Professor: Anjan Biswas, Department of Mathematical Sciences, Delaware State University.

Talks & Presentations

Conferences (Selected from last five years)

2024
- *Memory Effects for the Heat Conductivity in a Disordered Two-Phase Media (invited).* 16th International Hybrid Conference of the Euro-American Consortium for Promoting the Application of Mathematics in Technical & Natural Sciences (AMITANS'16), Albena, Bulgaria.
- *Identification of the Effective Diffusivity Coefficient of Polydisperse Spherical Suspension by using Random-Point Approximation (invited).* AMS Spring Southeastern Sectional Meeting, Florida State University, Tallahassee, FL.
- *Differences in Cancer Care Outcomes: A Machine Learning Investigation of Systemic Bias. (Contributed).* W. E. B. Du Bois Data Science Symposium 2024, Atlanta, GA.

2023
- *Memory Effects for the Heat Conductivity of Random Suspension of Spheres by using Stochastic functional expansions (Contributed).* 13th American Institute of Mathematical Science Conference on Dynamical Systems, Differential Equations and Applications, Wilmington, NC.
- *Identification of the Effective Diffusivity Coefficient of Polydisperse Spherical Suspension by using Random-Point Approximation (Contributed).* Virtual AMS Spring Eastern Sectional Meeting.

2022
- *A high-order implicit-explicit Runge-Kutta type scheme for Kuramoto-Sivashinsky equation (Invited).* 6th International Virtual Workshop on Nonlinear & Modern Mathematical Physics (NMMP).
- *A High-order Implicit-explicit Runge-Kutta type Scheme for Kuramoto-Sivashinsky Equation (Invited).* 12th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA.

2021
- *Stochastic Functional Expansion for Identifying the Effective Heat Conductivity Coefficient of Polydisperse Suspension (Invited).* 13th International Hybrid Conference of the Euro-American Consortium for Promoting the Application of Mathematics in Technical & Natural Sciences (AMITANS'13), Albena, Bulgaria.

2020
- *Stochastic Functional Expansion for Identifying the Effective Heat Conductivity Coefficient of Polydisperse Suspension (Invited).* 73rd Annual Meeting (Virtual) of the American Physical Society (APS) – Division of Fluid Dynamics (DFD), Chicago, IL.
- *Study of Memory Effects for the Heat Conductivity of Random Suspensions of Spheres (poster presentation).* HBCU-UP/CREST PI/PD meeting, Washington, D.C.

2019
- *Identification of the Effective Heat Conductivity Coefficient of Polydisperse Spherical Suspension by using Random Point Approximation (contributed).* AMS Spring Southeast Sectional Meeting, Auburn University, Auburn, AL.

Invited Seminars and Colloquia

- *Mathematical Modeling of the Microstructure of the Temperature Field for the Identification of Effective Heat Conductivity Suspensions.* School of Mechanical Engineering, Purdue University, West Lafayette, IN, 23rd July, 2019.

External Funding Supported Mentored Undergraduate Research

Funded through NSF Catalyst Project - 1800798

Summer 2022 – Spring 2023
- Jiwon Choi. *A Numerical Study for Expanded* SEIR Model for West Nile Virus Dynamics.

Fall 2021 – Spring 2022
- Willie Reynolds. *Fourier Split-Step Method for Solving Highly Dispersive KdV Type Equations.*

Spring 2021 – Summer 2021
- Willie Reynolds. *Numerical Solution of Nonlinear Heat Transfer Equation with an Exponentially Temperature-dependent Thermal Conductivity.*

External Funding Supported Mentored Undergraduate Research (continued)

Fall 2019 – Spring 2020 ◇ Jalen Williams. *Numerical Solutions of Kawahara Type Equations by Fourier Splitting Method.*

Spring 2019 ◇ Sammie Clayton. *Approximate Solution of Nonlinear Duffing Oscillator by using Adaptive Runge-Kutta Method.*

Summer 2018 – Fall 2018 ◇ Leo Degon. *Numerical Solutions of Gardner Equation by Modified Exponential Time Differencing Method.*

◇ Sammie Clayton. *Galerkin Method for Solving Ordinary Differential Equations of Lane-Emden type.*

Funded through NSF-HBCU-UP TIP - Interdisciplinary Data Analytics

Spring 2023 ◇ Luke Sanders. *On Predicting Baseball Pitching Stats using Machine Learning and Python.*

◇ Younggil Jo. *Analysis of* SkillCraft *Data by Applying Machine Learning Models.*

Spring 2021 ◇ Daniel Lemaitre. *Detecting the focal points of user's movie reviews with the aid of Natural Language Processing.* Co-mentor: Dr. David Simmonds, College of Business Administration, SSU.

Spring 2019 ◇ Moriah Byrd. *The Gulf Stream's Effect on the Variance of Temperature at Cape Hatteras Shelf.* Co-mentor: Dr. Amanda Kaltenberg, Department of Marine & Environmental Science, SSU.

Summer 2018 – Fall 2018 ◇ Leo Degon. *A Markov-chain Probability Distribution Mixture Approach to Hourly Forecasting of Clear-sky Index.*

Funded through AIM-AHEAD

Spring 2023 ◇ Davyon Giles. *Study of Predictive ML Algorithms for Synthetic Data from Pennsylvania Cancer Registry (PCR).*

Funded through NSF-HBCU-UP Project: Developing a Minor in Applied Maths at SSU

Spring 2020 – Summer 2020 ◇ Lindsay Anderson. *Mathematical Modeling of Maturation of the Central Nervous System: Primary Neurulation.*

Spring 2018 ◇ Olivia Komoroski. *Improved Mathematical Derivation of Reverse Gran Titration using Time-Dependent Sample Collection.* Co-mentor: Dr. Christopher Hintz, Department of Marine & Environmental Science, SSU.

Funded through NSF-CMMI-2029540 Undergraduate Research Experience (URE)

Summer 2021 ◇ Jaden Bryant & Alston Williams. *Visualizing How Magnetic Fields Shape Ferrofluid Droplets Using Python and Jupyter Notebooks.*
Both students received funding support of $5000 from NSF-CMMI-2029540-funded NC-NURE Project led by Dr. Ivan Christov and his research team in School of Mechanical Engineering, Purdue University, West Lafayette, IN.

NSF-funded MAGEC-STEMplus Summer Research Program

Summer 2016 ◇ Amar Wilkins. *Numerical Approximation of Ordinary Differential Equations by Using Chebyshev Polynomials.*

Service

Invited peer review	◇ Applied Numerical Mathematics ⊛ Partial Differential Equations in Applied Mathematics ⊛ Nonlinear Dynamics ⊛ Mediterranean Journal of Mathematics ⊛ International Journal of Partial Differential Equations ⊛ Fluids ⊛ Fractal & Fractional ⊛ Boundary Value Problems ⊛ Symmetry ⊛ Open Engineering ⊛ Physics Letter A ⊛ Journal of Applied Mathematics ⊛ Neural Computing and Applications ⊛ International Journal of Mathematical Education in Science and Technology.
Conference Organisation	◇ Organising Committee Member & Session Chair, Virtual Conference on Nonlinear & Modern Mathematical Physics: NNMP-2022. Organising & Scientific Steering Committee Member, 8^{th} (2018), 9^{th} (2019) and 10^{th} (2024) Annual Research Conference at Savannah State University. Session Chair, *Multiphase Flow*. 71^{st} Annual meeting of APS-DFD, Atlanta, GA, 2018.
Invited Review Panel Member	◇ DoD-SMART scholarship evaluation panel, 2019, 2020, 2021. Peach State Louis Stokes Alliance for Minority Participation (PSLSAMP) 11^{th} Annual Research Conference & Symposium, 2017.
Committee membership	◇ Member, Southeast Consortium for Research & Training in DOE Mission Driven Data Analytics and Machine Learning.

Awards & Professional Development Grants

Awards

2023	◇ SSU Faculty Research Excellence/Innovation Award.
2020	◇ SSU Faculty Excellence in Teaching Award.
2008	◇ *Rhodes Outstanding Teaching Assistant Award* from the Department of Mathematics, University of Louisiana at Lafayette.

Certification

2024	◇ Certificate of Completion: *Online Training: Solver Settings for Effective Analysis in* COMSOL *Multiphysics*. Awarded by AltaSim Technologies.
2022	◇ Certificate of Completion: CFD *Modeling in* COMSOL *Multiphysics*. Awarded by COMSOL.
	◇ Certificate of Completion: *Online Training: Introduction to* COMSOL *Multiphysics*. Awarded by COMSOL.
2019	◇ Certificate of Completion: *Teaching Online at* SSU – *Quality Matters Principles*. Awarded by Savannah State University.

Professional Development Grants

2017, 2018	◇ Stipend to Attend **INCLUDES SCI-STEPS** Juncture Team workshops, Vanderbilt University, Nashville, TN.
2014	◇ Stipend to attend *blended learning workshops with the teaching professors* hosted by Gettysburg College, Gettysburg, PA.
2012	◇ Faculty development grant to introduce Tablet PC Technology for enhancing students' learning experiences from Ctr. of Teaching & Learning, Delaware State University, Dover, DE.

Previous Employment

2013 – 2015	◇ Visiting Assistant Professor, Dept. of Mathematics, Gettysburg College, Gettysburg, PA.
2011 – 2013	◇ Visiting Assistant Professor, Dept. of Mathematics, Delaware State University, Dover, DE.

Previous Employment (continued)

2010 – 2011 ◇ Visiting Instructor, Dept. of Mathematics, Western Illinois University, Macomb, IL.

Skills

Programming	◇ Fortran 95 (with IMSL library), Mathematica, **R**, Python, MATLAB, Comsol.
Graphing Software	◇ Gnuplot, Xfig, Origin, GIMP Image Editor.
Web Dev	◇ HTML, CSS especially for GitHub pages.
typesetting and publishing	◇ TEX (LATEX, BIBTEX, PSTricks), most common productivity packages (for Windows, and Linux platforms), Vim.
Operating Systems	◇ Microsoft Windows family, Ubuntu, Linux Mint, and other Linux variants.

References

Available on Request