

# A K M Rokonuzzaman Sonet

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## 🎓 Education

- 2020– Present** **Ph.D. Candidate in Financial Mathematics**, Florida State University, USA  
Dissertation Title: Algorithmic Stability of Heavy-Tailed Stochastic Gradient Algorithms  
Advisor: Dr. Lingjiong Zhu  
Expected Graduation: Spring 2026
- 2020–2022** **Master of Science in Financial Mathematics**, Florida State University, USA
- 2015–2019** **Bachelor of Science in Mathematics**, University of Dhaka, Bangladesh

## 💼 Experience

- 2022– Present** **Department of Mathematics, Florida State University**  
**Instructor of Record**
- Calculus and Analytic Geometry III — Fall 2025, Spring 2026
  - Calculus and Analytic Geometry II — Spring 2025, Fall 2024
  - Calculus and Analytic Geometry I — Spring 2024
- Designed and taught Calculus I-III with full responsibility for syllabus, instruction, assessment, and grading for approximately 30 students each semester
- Recitation Instructor**
- Discrete Mathematics II — Fall 2023
  - Discrete Mathematics I — Spring 2023, Summer 2022
  - Calculus I — Fall 2022
- Facilitated problem sessions, ran quizzes, office hours, coordinated with course instructor.
- Assistant in Course Development**
- Calculus and Analytic Geometry I — Summer 2024
- Developed course content and assessments, aligned outcomes
- Summer 2023, 2025** **Graduate Research Assistant**, Florida State University  
Supervisor: Dr. Lingjiong Zhu  
Project: The Heavy-Tail Methods in Machine Learning
  - Investigate the emergence of heavy-tails in stochastic gradient algorithms
  - Study algorithmic stability under heavy-tailed noise
  - Characterize tail indices and analyze their implications on generalization
- Jan 2021– Dec 2021** **Graduate Teaching Assistant**, Florida State University
  - Taught Pre-Calculus Algebra to approximately 30 students
  - Assisted in teaching various undergraduate courses
  - Helped students grasp fundamental concepts and enhance their problem-solving skills
  - Led discussion sections, graded and held office hours
  - Assisted with exam proctoring and student support

## Research Work

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### Research Interests

Stochastic Optimization and Machine Learning Theory, Algorithmic Stability and Generalization, Data Science, Computational Finance and Derivative Pricing, Financial Risk Management

### Manuscripts - Preprint

- Dang, Thanh, Melih Barsbey, **A K M Rokonuzzaman Sonet**, Mert Gurbuzbalaban, Umut Simsekli, and Lingjiong Zhu (2025). *Algorithmic Stability of Stochastic Gradient Descent with Momentum under Heavy-Tailed Noise*. arXiv: [2502.00885 \[stat.ML\]](https://arxiv.org/abs/2502.00885).

### Manuscripts — In Preparation

- **A K M Rokonuzzaman Sonet**, Lingjiong Zhu, Emergence of Heavy-Tails in Homogenized Decentralized Stochastic Gradient Descent (DE-SGD)
- **A K M Rokonuzzaman Sonet**, Lingjiong Zhu, The Heavy-Tail Phenomenon in Stochastic Gradient Descent with Momentum (SGDm)

### Presentations

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- *Applied Quantitative Finance: A Project Portfolio*, Quant Finance Boot Camp, Erdős Institute, June 2025. Topics: Portfolio Optimization, Delta Hedging, Option Pricing
- *Stock Price Prediction using LSTM*, Data Science Boot Camp, Erdős Institute, June, 2022
- *Study of Some Basic Epidemiological Models*, Department of Mathematics, University of Dhaka, December 2018

### Awards

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- *Bettye Anne Busbee Case Graduate Fellowship*, recognition for outstanding scholarly work leading to doctoral candidacy, Department of Mathematics, Florida State University, 2024
- *FSU Math Distinguished Teaching Assistant Award*, an award for outstanding TA performance, 2025
- *University Scholarship* on undergraduate studies, University of Dhaka, 2019
- *The Duke of Edinburgh's Award: Bronze Level*, a global youth achievement award for individuals, 2018
- *Champion, Intra-Department Mathematics Contest*, Department of Mathematics, University of Dhaka, 2015

### Professional Memberships

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- American Mathematical Society (AMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Bangladesh Mathematical Society (BMS)

### Service

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- **Volunteer**, Florida State University Math Fun Day, 2026
- **Treasurer**, Bangladesh Student Association, Florida State University, 2022-23
- **Volunteer**, University Women's Mathematics Olympiad, 2018
- **Volunteer**, Light of Hopes Youth Foundation, 2016-19

## References

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- **Lingjiong Zhu, Ph.D.**

Professor, Department of Mathematics, Florida State University

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Relationship: Ph.D. Dissertation Advisor

- **Giray Okten, Ph.D.**

Professor and Associate Chair for Graduate Studies, Department of Mathematics, Florida State University

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Relationship: Ph.D. Dissertation Committee Member

- **Penelope Kirby, Ph.D.**

Coordinator of Graduate Teaching Assistants, Department of Mathematics, Florida State University

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Relationship: Graduate Teaching Assistant Coordinator

- **Arash Fahim, Ph.D.**

Associate Professor, Department of Mathematics, Florida State University

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Relationship: Graduate Course Instructor