Minah Oh

CONTACT INFORMATION

Department of Mathematics and Statistics
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EDUCATION

Ph.D in Mathematics, University of Florida, Gainesville, FL   05/2010
Dissertation Title: Efficient Solution Techniques for Axisymmetric Problems
Advisor: Dr. Jay Gopalakrishnan
MS in Mathematics, University of Florida, Gainesville, FL   05/2007
BS in Mathematics, Yonsei University, Seoul, Korea   08/2005
Exchange Student, St. Olaf College, Northfield, MN   2003 – 2004

POSITIONS

Professor, Department of Mathematics and Statistics   08/2022–present
James Madison University, Harrisonburg, VA
Associate Professor, Department of Mathematics and Statistics   08/2016–present
James Madison University, Harrisonburg, VA
Assistant Professor, Department of Mathematics and Statistics   08/2010–05/2016
James Madison University, Harrisonburg, VA
Graduate Teaching Assistant, University of Florida, Gainesville, FL   08/2005–05/2010
Intern, Citigroup, Sales and Trading in EM Markets, Seoul, Korea   2005
Intern, Tong Yang Venture Capital, Seoul, Korea   2003

CITIZENSHIP

United States Citizen

RESEARCH INTERESTS

Numerical Partial Differential Equations: Finite Element Methods and Finite Element Exterior Calculus, Efficient Solution Techniques for Axisymmetric Problems and its Applications, Optimal Control Problems

Numerical Linear Algebra: Low-Rank Approximation of Matrices and its Applications in Data Science

PUBLICATIONS

- Oh, Minah: "Multigrid for Axisymmetric H(curl)–problems," Submitted.
- Oh, Minah: "The Hodge Laplacian on Axisymmetric Domains and its Discretization," IMA Journal of Numerical Analysis. Volume 41 (2020), pp. 1569–1607.
  https://doi.org/10.1093/imanum/draa048
- Oh, Minah (with Ma and Wang): "P1 Finite Element Methods for a Weighted Elliptic State-Constrained Optimal Control Problem," Numerical Algorithms, Volume 87 (2021), pp. 1–17.
  https://doi.org/10.1007/s11075-020-00955-0
- Oh, Minah: "Multigrid in H(div) on Axisymmetric Domains," Journal of Mathematical Analysis and Applications, Volume 490, Issue 1 (2020).
  https://doi.org/10.1016/j.jmaa.2020.124209
- Oh, Minah (with Brenner and Sung): "P1 Finite Element Methods for an Elliptic State-Constrained Optimal Control Problem with Neumann Boundary Conditions," Results in Applied Mathematics, Volume 8 (2020).
  https://doi.org/10.1016/j.rinam.2019.100090

- Oh, Minah (with Brenner, Pollock, Porwal, Schedensack, and Sharma): "A C0 Interior Penalty Method for Elliptic Optimal Control Problems with Pointwise State Constraints in Three-Dimensions," The IMA Volumes in Mathematics and its Applications, Volume 160 (2016), pp. 1-22.

  `https://doi.org/10.1007/978-1-4939-6399-7`

- Oh, Minah: "De Rham Complexes arising from Fourier Finite Element Methods in Axisymmetric Domains," Computers and Mathematics with Applications 70 (2015), pp. 2063-2073.

  `https://doi.org/10.1016/j.camwa.2015.08.020`

- Oh, Minah: "Introducing Proofs to Calculus Students," MAA Notes Series "Beyond Lecture: Techniques to Improve Student Proof-Writing Across the Curriculum," 2015.

- Oh, Minah: "A New Approach to the Analysis of Axisymmetric Problems," IMA Journal of Numerical Analysis (2014) 34 (4): 1686-1700.

  `https://doi.org/10.1093/imanum/drt054`

- Oh, Minah (with Gopalakrishnan): "Commuting Smoothed Projectors in Weighted Norms with an Application to Axisymmetric Maxwell Equations," Journal of Scientific Computing, Vol. 51, pp. 394-420, 2012.

  `https://doi.org/10.1007/s10915-011-9513-3`

- Oh, Minah (with Copeland and Gopalakrishnan): "Multigrid in a Weighted Space arising from Axisymmetric Electromagnetics," Mathematics of Computation, Vol. 79, pp. 2033-2058, 2010.

  `https://doi.org/10.1090/S0025-5718-2010-02384-1`

- Oh, Minah: "Efficient Solution Techniques for Axisymmetric Problems," Ph.D. Dissertation, 2010. http://purl.fcla.edu/fcla/etd/UFE0041576

UNDERGRADUATE RESEARCH STUDENTS PUBLICATIONS

- Stock, Nicole (advisor: Oh, Minah): "Higher Order Fourier Finite Element Methods for Hodge Laplacian Problems on Axisymmetric Domains", SIAM Undergraduate Research Online, Vol. 14 (2021)

  `https://doi.org/10.1137/21S1416813`

- Keegan, Katherine, Melendez, David, Zheng, Jennifer (advisor: Oh, Minah): "A Modified Watermarking Scheme Based on the Singular Value Decomposition", SIAM Undergraduate Research Online, Vol. 14 (2021) `https://doi.org/10.1137/21S1411664`

- Bittner, Stephanie, Guo, Xuyi, and Zweber, Adam (advisors: Ducey, Joshua and Oh, Minah): "Integer Invariants of an Incidence Matrix related to Rota's Basis Conjecture," Missouri Journal of Mathematical Sciences 29(1), 2013.

  `https://doi.org/10.35834/mjms/1488423699`

PUBLISHED TECHNICAL REPORTS

- Chen, Kong, Oh, Sanan, and Wang (Mentor: Brendt Wohlberg): "Visual Words, Text Analysis Concepts for Computer Vision," IMA Mathematical Modeling in Industry XIII report, 2009.

RESEARCH GRANTS

National Science Foundation, grant number DMS-1913050, 07/01/2019–06/30/2022, "RUI: Efficient Numerical Methods for Axisymmetric Problems", $100,000 Awarded. *More information about my NSF-funded project can be found here.*

JMU College of Science and Mathematics Summer Research Grant $4000, 2015

JMU College of Science and Mathematics Summer Research Grant $4000, 2011

UNDERGRADUATE RESEARCH STUDENTS

Faculty Advisor for summer@ICERM2020 Fast Learning Algorithms for Numerical Computation and Data Analysis, Brown University   summer 2020
`https://icerm.brown.edu/summerug/2020/`.

1. Katherine Keegan, David Melendez, and Jennifer Zheng
   Project Title: Randomized Singular Value Decomposition and its Applications
   Final Report:
   `https://icerm.brown.edu/summerug/2020/studentprojects/Randomized_SVD_final_report.pdf`
2. Trevor Crupi, Yonah Moise, and Hannah Odom Project Title: Multigrid for Fourier Finite Element Methods on Axisymmetric Domains
   Final Report:
   `https://icerm.brown.edu/summerug/2020/studentprojects/IterativeMethods_FinalReport.pdf`

Nicole Stock, JMU
Honors Thesis Title: Higher Order Finite Element Methods for Axisymmetric Hodge Laplacian Problems   2020–2021
⋆ Poster Presentation First Prize, MAA MD-DC-VA Section Meeting, spring 2021

Grant Henderson, Jacob Spangler, JMU
Project Title: Fourier-FEMs for Elliptic State-Constrained Optimal Control Problems on Axisymmetric Domains   spring 2020
Final Report:
`https://drive.google.com/file/d/1cXe8zaKmYG6tMYRsu7d-ouGPnOR3H_gT/view?usp=sharing`

Brendan Armani, Andrew Levy, and Andrew Tomassone, JMU   spring 2018
Project Title: Analysis of the Singular Value Decomposition Applied to Image Compression
⋆ Student Presentation Second Prize, MAA MD-DC-VA Section Meeting, spring 2018

Sophia Mancini and Unyoung Park, JMU Independent Studies   spring 2017
Project Title: The Singular Value Decomposition and its Applications
⋆ Poster Presentation First Prize, MAA MD-DC-VA Section Meeting, spring 2017

Ben Rhodes, JMU Independent Studies   spring 2017 – spring 2018
Project Title: Numerical Methods for Axisymmetric Problems and Dealii

Charles Crook, JMU Internal REU   summer 2013
Project Title: Finite Element Methods for the Poisson Equation and its Applications

Justin Hall, JMU Internal REU   summer 2013
Project Title: Finite Element Methods for the Axisymmetric Maxwell Equations

Jacob Rhodes, JMU Independent Studies   2012–2013
Project Title: Finite Element Methods and 3D Printing

NSF REU (Co-mentored with Josh Ducey of JMU)   summer 2012
Students: Stephanie Bittner, Michael Cheung, Xuyi Guo, and Adam Zweber
Project Title: Approaches to Rota's Basis Conjecture

COURSES   Numerical Partial Differential Equations
TAUGHT   Numerical Linear Algebra
              Partial Differential Equations and Fourier Series
              Computers and Numerical Algorithms
              Methods of Applied Calculus
              Linear Algebra with Differential Equations
              Calculus 1, 2, and 3
              Business Calculus
              Nature of Mathematics
              Precalculus: Algebra and Trigonometry

PRESENTATIONS

- Invited Colloquium and Seminar Talks

Colloquium, Salisbury University, Virtual Colloquium,	Apr. 2021
Colloquium, Colorado School of Mines, Virtual Colloquium,	Oct. 2020
Colloquium, University of North Florida, Jacksonville, FL	Feb. 2019
Colloquium, St. Olaf College, Northfield, MN	Oct. 2018
Numerical Analysis Seminar, Louisiana State University	Oct. 2018
Numerical Analysis Seminar, Mississippii State University	Sep. 2018
Colloquium, University of Mary Washington	Apr. 2016
Applied & Computational Mathematics Seminar	
Portland State University, Portland, OR	Apr. 2016
Colloquium, Longwood University, Farmville, VA	Sep. 2013
Numerical Analysis Seminar, Virginia Tech, Blacksburg, VA	Nov. 2011
Colloquium, Colgate University, Hamilton, NY	Feb. 2010
Colloquium, University of North Carolina at Asheville	Feb. 2010
Colloquium, Clarkson University, Potsdam, NY	Feb. 2010
Colloquium, James Madison University, Harrisonburg, VA	Jan. 2010

- Conference Presentations

  - **Research Presentations**

    AMS Spring Southeastern Sectional Meeting, Georgia Institute of Technology, Special Session on Recent Development in Advanced Numerical Methods for Partial Differential Equations   Mar. 2023 (Scheduled.)
    Multigrid for Axisymmetric H(curl)-Problems and its Applications

    Finite Element Circus, Carnegie Mellon University   Oct. 2022
    Multigrid for Axisymmetric H(curl)–Problems

Afternoon Invited Address
Fall 2021 MAA MD-DC-VA Sectional Meeting   Nov. 2021
Amazing Applications of Linear Algebra

50th Anniversary of the Finite Element Circus   Nov. 2020
P1 Finite Element Methods for a Weighted Elliptic State-Constrained Optimal
Control Problem

AMS Fall Central Sectional Meeting, Special Session on Recent Advances in Scientific Computing and Applications   Sep. 2020
Multigrid in H(div) on Axisymmetric Domains

16th Copper Mountain Conference On Iterative Methods, Multigrid in H(div)
on Axisymmetric Domains (Canceled due to COVID-19.)   Mar. 2020

Joint Mathematics Meeting, Denver, CO   Jan. 2020
P1 Finite Element Methods for Elliptic Optimal Control Problems

Finite Element Circus, Virginia Tech.   Nov. 2019
Elliptic State-Constrained Optimal Control Problems with Neumann Boundary
Conditions

MAA MD-DC-VA Section Meeting, Hood College & Frederick County Community
College   Apr. 2019
Using Mathematics to Solve Real-World Problems

Joint Mathematics Meeting, Baltimore, MD   Jan. 2019
The Hodge Laplacian on Axisymmetric Domains

Finite Element Circus, University of Delaware   Nov. 2018
The Hodge Laplacian on Axisymmetric Domains

MAA MD-DC-VA Sectional Meeting, CNU   Nov. 2017
Grad, Curl, and Div on Axisymmetric Domains

Cascade RAIN Meeting, Washington State University   Apr. 2016
Tools to Analyze Axisymmetric Problems

Finite Element Circus, George Mason University   Mar. 2015
De Rham Complexes arising from Fourier-FEMs in Axisymmetric Domains

Finite Element Circus/Rodeo, Louisiana State University   Mar. 2013
A New Approach to the Analysis of Axisymmetric Problems

2013 Joint Mathematics Meeting, San Diego, CA   Jan. 2013
A New Approach to the Analysis of Axisymmetric Problems

2011 Joint Mathematics Meeting, New Orleans, LA   Jan. 2011
Commuting Smoothed Projections in Weighted Spaces

Finite Element Circus, IMA, Minneapolis, MN   Nov. 2010
Commuting Smoothed Projections in Weighted Spaces

Finite Element Circus, University of Delaware, Newark, DE   Apr. 2009
Multigrid in a Weighted Spaces arising from Axisymmetric Electromagnetics

33rd SIAM Southeastern-Atlantic Section Conference   Apr. 2009
University of South Carolina
Recent Advances in Computational Electromagnetics

– **Presentations related to Undergraduate Education**

Joint Mathematics Meeting, Denver, CO	Jan. 2020
How Exposure to Research in Numerical PDEs Influenced Students In My PDE Class	
Joint Mathematics Meeting , Baltimore, MD	Jan. 2019
Teaching Linear Algebra through its Applications	
MAA MD-DC-VA Section Meeting, UMW	Nov. 2018
The Value of Solid Mathematics for Computer Algorithms	
MAA MD-DC-VA Sectional Meeting, Johns Hopkins University	Nov. 2016
Effective In-Class Programming Projects for STEM Majors	
JMU Kappa Delta Pi's Annual Educators' Conference	Feb. 2016
Making a Difference with Teaching	
MAA MD-DC-VA Sectional Meeting, Roanoke College	Mar. 2015
Finite Element Methods and Undergraduate Research	
MAA MD-DC-VA Section Meeting, Harrisonburg, VA	Apr. 2014
Introducing Proofs to Calculus Students	
2013 Joint Mathematics Meeting, San Diego, CA	Jan. 2013
An Applied Project for Linear Algebra Students: Finite Element Methods	
MAA MD-DC-VA Section Meeting, Newport News, VA	Nov. 2011
An Applied Project for Linear Algebra Students	
2011 Joint Mathematics Meeting, New Orleans, LA	Jan. 2011
Introducing Proofs to Calculus Students	

STUDENT PRESENTATIONS AND AWARDS

Nicole Stock: MAA MD-DC-VA Section Meeting (Virtual)	Apr. 2021
⋆ Award: Poster Presentation First Prize	
Trevor Crupi, Yonah Moise, and Hannah Odom	
JMU SUMS (Virtual)	Dec. 2020
SIAM Annual Meeting	Jul. 2021
Katherine Keegan, David Melendez, and Jennifer Zheng	
JMU SUMS (Virtual)	Dec. 2020
SIAM Annual Meeting	Jul. 2021
Brendan Armani, Andrew Levy, and Andrew Tomassone	
MAA MD-DC-VA Section Meeting	Apr. 2018
⋆ Award: Student Presentation Second Prize	
Ben Rhodes: MAA MD-DC-VA Section Meeting	Apr. 2018
Sophia Mancini and Unyoung Park: MAA MD-DC-VA Section Meeting	Apr. 2017
⋆ Award: Poster Presentation First Prize	

Charles Crook: JMU SUMS   Oct. 2013

Justin Hall, JMU SUMS   Oct. 2013

Adam Zweber, Joint Mathematics Meeting   Jan. 2013

WORKSHOPS   (Invited) Mathematisches Forschungsinstitut Oberwolfach Workshop   Jun. 2022
                  Hilbert Complexes: Analysis, Applications, and Discretizations
                  Oberwolfach, Germany. (Institute offering board and lodging.)

                  Workshop at East Coast Optimization Meeting (ECOM) 2021   Apr. 2021
                  Optimization for Machine Learning
                  Virtual Conference

                  Workshop at CM2021: 20th Copper Mountain Conference on Multigrid Methods Mar. 2021
                  Algebraic Multigrid and Advanced Topics, Parallel Multigrid
                  Virtual Conference

                  ICERM Semester Workshop   Jun. 2018
                  Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials
                  ICERM, Providence, RI. (Attended with full travel support by organizers.)

                  ICERM Semester Workshop   Oct. 2017
                  Mathematical and Computational Aspects of Radar Imaging
                  ICERM, Providence, RI.

                  IMA Special Workshop   Mar. 2015
                  WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical
                  Partial Differential Equations and Scientific Computing
                  Louisiana State University. (Attended with full travel support by organizers.)

                  IMA Special Workshop   Oct. 2014
                  Structure-Preserving Discretizations of Partial Differential Equations
                  IMA, Minneapolis, MN. (Attended with full travel support by organizers.)

                  IMA Special Workshop   Aug. 2014
                  WhAM! A Research Collaboration Workshop for Women in Applied Mathematics: Numerical
                  Partial Differential Equations and Scientific Computing
                  IMA, Minneapolis, MN. (Attended with full travel support by organizers.)

                  NSF/CBMS Conference   Jun. 2012
                  Finite Element Exterior Calculus (FEEC)
                  ICERM, Providence, RI. (Attended with full travel support by organizers.)

                  IMA Annual Program Year Workshop   Jun. 2011
                  Large-scale Inverse Problems and Quantification of Uncertainty
                  IMA, Minneapolis, MN.

                  IMA Annual Program Year Workshop   Nov. 2010
                  Numerical Solutions of Partial Differential Equations: Fast Solution Techniques
                  IMA, Minneapolis, MN. (Attended with full travel support by organizers.)

                  IMA Math Modeling Mathematical modeling in industry XIII   Aug. 2009
                  A Workshop for Graduate Students
                  IMA, Minneapolis, MN. (Attended with full travel support by organizers.)

PROFESSIONAL ASSOCIATION	Mathematical Association of America (MAA)
	American Mathematical Society (AMS)
	Society for Industrial and Applied Mathematics (SIAM)
	Association for Women in Mathematics (AWM)

PROFESSIONAL SERVICE

- **Professional Societies or Grant Agencies**

Past Chair, MD-DC-VA Section of the MAA	2021–2022
Chair, MD-DC-VA Section of the MAA	2019–2021
Conference Organizer, MAA MD-DC-VA Virtual Sectional Meeting	Apr. 2021
Conference Organizer, MAA MD-DC-VA Virtual Sectional Meeting	Nov. 2020
Program Chair, MD-DC-VA Section of the MAA	2016–2018
Project NExT Consultant	2020–present
NSF panelist	2019 and 2020
MAA Tensor Women and Mathematics Grant Panelist	2015 and 2017–2019
MAA Committee on the Participation of Women (CPW)	2018–2024
Chair Elect, MD-DC-VA Section of the MAA	2018–2019
MAA MD-DC-VA Section's Liaison with the AWM	2016–present
At Large Member MD-DC-VA MAA Section Meeting	2013–2015
Paper Referee SIAM Journal on Numerical Analysis (SINUM), Computers and Mathematics with Applications (CAMWA), Journal of Scientific Computing (JSC), Journal of Computational Physics (JCP), Results in Applied Mathematics (RINAM), and Computer Methods in Applied Mechanics and Engineering (CMAME)	2011–present

Regular Undergraduate Student Poster and Paper Judge at Professional Meetings

- **Department, College, and University**

Advisory Committee	Aug. 2021–present
Chair of the Applied Math Committee	Aug. 2021–present
Personnel Advisory Committee	Aug. 2019–May 2021
Member of JMU Asian Pacific Islander Desi Americans (APIDA) Caucus	Sep. 2021–present
JMU AWM Student Chapter Faculty Advisor	2012–2013, 2016–present
Established the JMU AWM Student Chapter.	Dec. 2011
Applied Math Committee	fall 2010–present
Student Activities Committee	fall 2014–present
Academic Advisor for Math Majors	fall 2011–present
Academic Program Review Committee	spring 2015–spring 2016

Student Awards Committee	fall 2014-2015
Student Evaluations of Teaching Committee	2014-2015
Colloquium Committee	2013-2014
Search Committee	2012–2013

- **Outreach Activities**

  Creator of Girls' Math and Coding Day at JMU (an NSF-funded event where 20 local female high school students come to James Madison University and learn mathematics and its applications with programming)   Mar. 2020

  Workshop leader for Expanding Your Horizons (EYH, a one-day math and science conference for girls in grades 6-8), James Madison University   Apr. 2011 and Apr. 2015

  Volunteer Math Tutor   summer 2010
  The Arbor House (homeless shelter for single moms) Gainesville, FL

- **Others**

  Conference Advisor   2008–2009
  The Second SIAM Gators Student Conference, University of Florida

  President, SIAM Student Chapter, University of Florida   2007–2008

HONORS AND AWARDS

Section Project NExT	2010–2012

Graduate Teaching Award, University of Florida   Mar. 2007
20 awards given among several thousands of Teaching Assistants in the university.

Departmental Teaching Award   Mar. 2007
Department of Mathematics, University of Florida

SIAM Student Chapter Certificate of Recognition   May 2008
The SIAM Education Committee

SKILLS

Computer skills: Fluent in C/C++ Programming, Matlab, Python, Git, and Latex.
Language: Bilingual in English and Korean.