Punit Gandhi

Department of Mathematics and Applied Mathematics
Virginia Commonwealth University
1015 Floyd Ave. Box 842014
Richmond, VA 23284-2014, USA

Office: Harris Hall 4177
Telephone: +1 (804) 828-1301
Email: gandhipr@vcu.edu
https://punitgandhi.github.io

Academic Appointments

Virginia Commonwealth University (VCU), Richmond VA.
Department of Mathematics and Applied Mathematics
Assistant Professor 2019-Present

Education and Postdoctoral Training

Postdoctoral Fellow 2016-2019
Mathematical Biosciences Institute, The Ohio State University.

Ph.D. University of California, Berkeley. Physics. May 2016
Thesis: "Localized states in driven dissipative systems with time-periodic modulation"
Advisor: Edgar Knobloch

B.S. Cornell University. Applied and Engineering Physics. May 2004
Honors Project: "Relativistic jets from accretion disks"

Scientific Journal Articles

P. Gandhi, Y. Wang. A conceptual framework for modeling a latching mechanism for cell cycle regulation. *Math. Biosci.*, **382** 109396 (2025).

M. V. Ciocanel, P. Gandhi, K. Niklas, A. T. Dawes. Quantifying symmetry transitions in dynamic morphological systems. *Math. Biosci.*, **384**, 109431 (2025).

P. Gandhi, L. Liu, M. Silber. A Pulsed-Precipitation Model of Dryland Vegetation Pattern Formation. *SIAM J. Appl. Dyn. Sys.*, **22**(2), 657–693 (2023).
-Featured in SIAM News **57**(6), July 2024.

P. Gandhi, M. A. Robert, J. Palacios, D. Chan. Effects of contact tracing and self-reporting in a network disease model. *Lett. Biomath.*, **9**(1), 23–39 (2022).

P. Gandhi, M. V. Ciocanel, K. Niklas, A. T. Dawes. Identification of approximate symmetries in biological development. *Phil. Trans. R. Soc. A*, **379**(2213), 20200273 (2021).
-Featured in SIAM News **55**(3), April 2022.

P. Gandhi, S. Bonetti, S. Iams, A. Porporato M. Silber. A fast-slow model for banded vegetation pattern formation in drylands. *Physica D*, 132534 (2020).
-Featured in SIAM News Blog Entry on January 9, 2020.

P. Gandhi, M. Golubitsky, C. Postlethwaite, I. Stewart, Y. Wang. Bifurcations on fully inhomogeneous networks. *SIAM J. Appl. Dyn. Sys.* **19**(1), 366–411 (2020).

P. Gandhi, Y. Zelnik, E. Knobloch. Spatially localized structures in the Gray–Scott model.

Phil. Trans. R. Soc. A **376**, 20170375 (2018).

P. Gandhi, L. Werner, K. Gowda, S. Iams, M. Silber. A topographic mechanism for arcing of dryland vegetation bands. *J. R. Soc. Interface* **15**(147), 20180508 (2018).

Y. Zelnik, P. Gandhi, E. Knobloch, E. Meron. Implications of tristability on pattern forming ecosystems. *Chaos* **28**, 033609 (2018).

B. Pradenas, I. Araya, M. G. Clerc, C. Falcón, P. Gandhi, E. Knobloch. Slanted snaking of localized Faraday waves. *Phys. Rev. Fluids* **2**, 064401 (2017).

P. Gandhi, C. Beaume, E. Knobloch. Dynamics of phase slips in systems with time-periodic modulation. *Phys. Rev. E* **92**, 062914 (2015).

P. Gandhi, C. Beaume, E. Knobloch. A new resonance mechanism in the Swift–Hohenberg equation with time-periodic forcing. *SIAM J. Appl. Dyn. Sys.* **14**(2), 860–892 (2015).

-Featured Media Gallery Entry in SIAM DS Web Magazine, July 2015.

P. Gandhi, C. Beaume, E. Knobloch. Localized states in periodically forced systems. *Phys. Rev. Lett.* **114**, 034102 (2015).

Conference Proceedings and Other Scientific Publications

P. Gandhi, S. Iams, S. Bonetti, M. Silber. Vegetation Pattern Formation in Drylands. *Dryland Ecohydrology.* Springer. 2nd Edition (2019).

P. Gandhi, C. Beaume, E. Knobloch. Time-periodic forcing of spatially localized structures. Nonlinear Dynamics: Materials, Theory and Experiments. *Springer Proc. Phys.* **173**, 303–316 (2016).

Scholarship of Teaching and Learning

J. Reid, M. Ahmadian, D. Jennings, A. A. Pepperl, 2020-2023 Institute on Inclusive Teaching cohorts†, S. E. Golding, A. A. Johnson. Saying It Aloud: Inclusive Teaching Statements Impact on Student Success and Engagement. *J. College Science Teaching*, 1–14 (2025)

† I am a listed co-author as a member of the 2022-2023 IIT cohort, for data acquisition.

C. Bergren, P. Gandhi, J. A. Livezey, R. Olf. A tale of two slinkies: Learning about model building in a student-driven classroom. *Phys. Teach.* **56**(3), 134–137 (2018).

P. Gandhi, J. Livezey, A. M. Zaniewski, D. L. Reinholz, D. R. Dounas-Frazer. Attending to experimental physics practices and lifelong learning skills in an introductory laboratory course. *Am. J. Phys.* **84**(9), 696–703 (2016).

D. R. Dounas-Frazer, G. Z. Iwata, P. Gandhi. Uncertainty analysis for a simple thermal expansion experiment. *Am. J. Phys.* **81**, 338 (2013).

Research Grants

Collaboration Grant for Mathematicians (PI), Simons Foundation, $42k 2022–2027

Modeling dryland vegetation patterns across timescales.

Education Grants, Awards, Fellowships and Training

Affordable Course Content Award (Co-PI), VCU, $2k 2024–2025
Creation of ancillary open access materials for undergraduate numerical methods in the department of mathematics and applied mathematics.

First-Generation Student Success Research Grant (Co-PI), VCU, $5k 2022–2023
Awareness and usage of math resources for first-generation students.

Leaders for Inclusive Learning, College of Humanities and Sciences, VCU. 2021
-Featured in VCU News, July 13, 2022.

Project NExT Fellow, Mathematical Association of America. 2019

Berkeley Connect Mentoring Fellowship, Physics, University of California, Berkeley. 2014

Award for Improving Undergraduate Education, American Physical Society. 2012
-To the Berkeley Compass Project in which I held leadership and teaching positions.

Invited Presentations

The impact of rainfall variability on pattern formation in a flow-kick model for dryland vegetation bands
-Minisymposium, SIAM Conference on Applications of Dynamical Systems, Denver, CO. May 15, 2025
-Mathematical Biology Seminar, U. Penn., Philadelphia, PA. Nov. 11, 2024
-Research Colloquium, Dept. of Math and Econ., Virginia State University, Petersburg, VA. Nov. 7, 2024

Resilience to environmental variability in a flow-kick model of dryland vegetation pattern formation
-Minisymposium, SIAM Conference on Coherent Structures and Nonlinear Waves, Baltimore, MD. Jun. 24, 2024

Characterizing morphology transitions in biological systems with approximate symmetry
(virtual) Summer Seminar Series, Society for Mathematical Biology. Jun. 18, 2024

Mathematics of pattern formation
-(virtual) REU Seminar, VCU. Jun. 7, 2024

Conceptual modeling of dryland vegetation patterns across timescales
-Colloquium, Center for Ecological Sciences, Indian Institute of Science, Bangaluru, India. Apr. 3, 2024
-MPS Division Research Seminar, Ahmedabad University, Ahmedabad, India. Mar. 27, 2024
-Biomath Seminar, Duke University, Durham, NC. Nov. 10, 2023
-Dynamical Systems in the Life Sciences Conference, Columbus, OH. Jul. 13, 2023
-Minisymposium, SMB Annual Meeting, Columbus, OH. Jul. 20, 2023

Pattern formation in biology and ecology
-Biology Student Seminar, Ahmedabad University, Ahmedabad, India. Feb. 28, 2024

Vegetation pattern formation in drylands: Impacts of changing storm characteristics
-Minsymposium, SIAM Conference on Applications of Dynamical Systems, Portland, OR. May 17, 2023

Quantifying asymmetry in biological systems
-Biomath Seminar, VCU, Richmond, VA. Sept. 30, 2022
-(virtual) Scientific Session, AAAS Annual Meeting. Feb. 18, 2022

An entropy-based method for quantifying asymmetry in biological systems
-Minisymposium, SIAM Conference on the Life Sciences, Pittsburgh, PA. Jul. 12, 2022

Response of dryland vegetation bands to stochastic rain pulses
-(virtual) Minisymposium, Joint Mathematics Meetings. Apr. 8, 2022

A pulsed-precipitation model of banded vegetation pattern formation in Drylands
-(virtual) Dynamical Systems Seminar, Ohio State University. Mar. 10, 2022

Dynamics of dryland vegetation bands on heterogeneous terrain
-(virtual) Minisymposium, SIAM Conference on Applications of Dynamical Systems. May 23, 2021

A fast-slow switching model of banded pattern formation in drylands
-(virtual) Mathematical Biology Seminar, Virginia Tech. Apr. 21, 2021
-(virtual) Mathematical Biology Seminar, University of Iowa. Dec. 7, 2020
-(virtual) SIAM Conference on Mathematics of Planet Earth. Aug. 10, 2020
-Math Department Colloquium, William and Mary, Williamsburg, VA. Nov. 1, 2019

Using pattern formation in the presence of spatial heterogeneity to learn about dryland ecosystems
-(virtual) SIAM Student Chapter Lecture, Florida Atlantic University, Boca Raton, FL. Dec. 3, 2020

Water transport in models of dryland vegetation patterns
-Minisymposium, SIAM Conference on Applied Dynamical Systems, Snowbird, UT, USA. May 20, 2019
-Minisymposium, Joint Math Meeting, Baltimore, MD. Jan. 18, 2019
-Dynamical Systems Seminar, University of Minnesota, MN. Sep. 17, 2018
-Minisymposium, SIAM Conference on Nonlinear Waves and Coherent Structures, Anaheim, CA. Jun. 14, 2018

Time-periodic forcing of spatially localized structures
-Science Lecture Series, Ohio Wesleyan University, Delaware, OH. Dec. 1, 2016
-Nonlinear Physics Seminar, University of Chile, Santiago, Chile. Dec. 4, 2015

Visiting Appointments, Working Groups, Summer Schools and Conference Minisymposia

IMSI Interdisciplinary Research Cluster, Chicago, IL. August 5-14, 2024
Project: "Exploring shifts in biogeochemical cycles and mass extinction events through

slow-fast dynamical systems"

Visiting Researcher, Ahmedabad University, Ahmedabad, India. Feb.-Apr. 2024
Host: Dr. Jitesh Jhawar, Ecology Cluster, School of Arts and Sciences.

IMSI Interdisciplinary Research Cluster, Chicago, IL. June 20-30, 2023
Project: "Climate Tipping Phenomena in Non-autonomous Paleoecosystems"

Mathematics and Climate Research Network Meeting, Portland, OR. May 19-20, 2023
Working group participant

Joint Mathematics Meetings, Boston, MA. Jan. 4-7, 2023
Session organizer: "Kicks, Shocks, Recovery and Resilience: Impulsive Models in Ecology and Socio-Economic Systems"

VCU Institute for Sustainable Energy and Environment, Charles City, VA. Nov. 17, 2022
Rice Rivers Center Meeting

NSF MODULUS Conference, Fairfax, VA. Aug. 8-11, 2022
Working group participant

SIAM Conference on the Life Sciences, Pittsburgh, PA. Jul. 11-14, 2022
Session organizer: "Symmetry, Robustness and Entropy in Living Systems"

Joint Mathematics Meetings, virtual. Jan. 6-9, 2021
Session organizer: "Recent Advances in Ecological Modeling"

Dynamics and data in the COVID-19 pandemic, American Institute of Mathematics, San Jose, CA. June 22 - July 31, 2020
Mentor for virtual summer school

SIAM Conference on Applied Dynamical Systems, Snowbird, UT. May 19-23, 2019
Session organizer: "The influence of network structure and symmetry on dynamics"

Focused Research Group: Frontiers in Nonlinear and Stochastic Modeling of Mass Extinction, Columbus, OH. Mar. 28-29, 2019

Current Topics Workshop: Collective Behavior and Emergent Phenomena in Biology, Columbus, OH. Sep. 10-12, 2018
Project: "Risk Aversion and Collective Decision Making in Ants"

AMS Mathematics Research Community: Agent Based Modeling in Biological and Social Systems, West Greenwich, RI. Jun. 17-23, 2018
Project: "Analysis of the Twitter Response to Recent Mass Shootings"

SIAM Conference on Nonlinear Waves and Coherent Structures, Anaheim, CA. Jun. 11-14, 2018
Session organizer: "Vegetation Patterns: Modeling, Analysis, and Data"

SIAM Conference on Applied Dynamical Systems, Snowbird, UT. May 21-25, 2017
Session organizer: "Topographic influences on vegetation patterns in semi-arid regions"

Teaching Experience

Virginia Commonwealth University, Richmond VA.
Department of Mathematics and Applied Mathematics

Math 632: *Ordinary Differential Equations I*	SP21, SP23
Math 585: *Biomathematics Seminar: Patterns!*	FA21
Math 535: *Introduction to Dynamical Systems*	FA23, FA24
Math 415: *Numerical Methods*	SP20, FA20, SP22, SP23
Math 310: *Linear Algebra*	FA21, FA22, FA23
Math 301: *Differential Equations*	FA19, SP20
Math 201: *Calculus with Analytic Geometry II*	FA24, SP25
Math 200: *Calculus with Analytic Geometry I*	FA20, SP21, FA22, SP23, FA23

The Ohio State University, Columbus OH.
Department of Mathematics

Math 2174: *Linear Algebra and Differential Equations for Engineers*	FA17

University of California, Berkeley CA.
Department of Physics

Physics 98: *Introduction to Measurement Uncertainty*	SP13

MS 101, Bronx NY.

8th Grade Earth Science	2004-2005
7th Grade Life Science	2005-2006
7th Grade Mathematics	2005-2006

Service

Department of Mathematics and Applied Mathematics, Virginia Commonwealth University

VCU Testing Site Manager, American Mathematics Competition	2023-Present
Member, Organizing Committee for BAMM! conference	2019-Present
Member, Outreach Committee	2024-Present
Member, Organizing Committee for Bridges 2024 conference	2023-2024
Member, Undergraduate Cirriculum Committee	2023-2024
Team Coach, COMAP International Mathematical Contest in Modeling	2020-2023
Member, Classroom Visitation Committee	2023-2024
Organizer, Biomath Seminar	2022-2023
Member, Diversity, Equity and Inclusion Committee	2022-2023
Member, Undergraduate Affairs Committee	2021-2022
Faculty Mentor, for students in PhD program	2020-2022
Member, Graduate Affairs Committee	2020-2021
Organizer, VCU Mathematical Contest in Modeling	Fall 2019

College of Humanities and Sciences, Virginia Commonwealth University

Member, COVID-response working group on enrollment	Summer 2020

Mid-Atlantic Regional Math Alliance

Member, Website Committee 2024-Present

Mathematical Biosciences Institute, Ohio State University

Volunteer, Florence Nightingale Day Fall 2018

Organizer, Postdoctoral professional development seminar 2017-2018

Presenter, Introduction to mathematical biology for Summer 2017, 2018, 2019
Sampling Advanced Mathematics for Minority Students (SAMMS) Program

Judge, Ohio State University Mathematical Contest in Modeling Fall 2017, 2018

Organizer, Cell motility journal club Spring 2017

Project Mentor, Calculus for the biological sciences Fall 2016, 2018

Referee for Funding Agencies: *Israel Science Foundation, Food from Thought (U. Geulph).*

Mathematical Modeling Contest Judging: SCUDEM 2022-2023.

Scientific Advisory Committees: MathSEE Symposium 2023.

Poster/competition judge: SIAM Dynamical Systems Poster Judge (2025, 2023), Mathcounts Regional Competition Grader (2025), Middle/High School Roller Coaster Competition Judge (2024, 2023), SMB Annual Meeting Poster Judge (2023), SCUDEM Undergraduate Mathematical Modeling Competition Judge (2023, 2022).

Referee for Journals: *Journal of Nonlinear Science, Journal of Mathematical Biology, Mathematical Methods in the Applied Sciences, Communications Biology, Mathematical Medicine and Biology, Royal Society Proceedings A, Nonlinearity, Journal of Theoretical Biology, Bulletin of Mathematical Biology, Nonlinear Dynamics, Catena, Oikos, Environmental Research Letters, Discrete & Continuous Dynamical Systems - S, Systems, SIAM Journal on Applied Mathematics, SIAM Journal on Applied Dynamical Systems, Physical Review Letters, Physica D, Chaos, Ecological Complexity, American Naturalist, PLOS One, Mathematical Biosciences, Mathematical Biosciences and Engineering, Forest Ecology and Management Journal of Vibrations and Acoustics, Nonlinear Processes in Geophysics, The Physics Teacher.*