

# Daniel Gomez

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**Address** Department of Mathematics and Statistics  
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## Employment

**2024- present** Assistant Professor - University of New Mexico  
Department of Mathematics and Statistics

**2021- 2024** Postdoctoral Fellow - University of Pennsylvania  
Center for Mathematical Biology & Department of Mathematics  
Funding: NSERC (2021,2022), Simons Foundation (2021-2024)

## Education

**2016- 2020** PhD in Applied Mathematics - The University of British Columbia, Vancouver  
Advisors: Michael J. Ward, Juncheng Wei  
Thesis: *An Analysis of Localized Patterns in Some Novel Reaction Diffusion Models*

**2014-2016** MSc in Applied Mathematics - The University of British Columbia, Vancouver  
Advisors: Anthony Peirce, Michael J. Ward  
Thesis: *A Non-Singular Integral Equation Formulation of Permeable Semi-Infinite Hydraulic Fractures Driven by Shear-Thinning Fluids.*

**2010-2014** BSc (Honours) in Mathematical Physics - The University of Saskatchewan, Saskatoon  
Graduated with High Honours

**2009-2014** BE in Engineering Physics -The University of Saskatchewan, Saskatoon  
Graduated with Great Distinction

## Research Interests

Applied partial differential equations, asymptotic analysis, singular perturbations, pattern formation, reaction-diffusion systems, fractional operators, Lévy flights, interface dynamics, and mathematical biology.

## Publications

- [1] D. Gomez, J. Wei. *Existence and Stability of a Boundary Layer with an Interior Spike in the Singularly Perturbed Shadow Gierer-Meinhardt System.* J. Nonlinear Science, 34(24) (2024).
- [2] D. Gomez, K.Y. Lam, Y. Mori. *Front propagation in the shadow wave-pinning model.* J. Math. Biol., 86(72) (2023).
- [3] D. Gomez, J. Wei, Z. Yang. *Multi-spike solutions to the one-dimensional subcritical fractional Schnakenberg System.* Physica D, 448 (2023).

- [4] D. Gomez, J. Wei, W. Yang. *Stability of Spike Solutions to the Fractional Gierer-Meinhardt System in a One-Dimensional Domain*. Numer. Math. Theor. Meth. Appl., 15(4) (2022).
- [5] D. Gomez, L. Mei, J. Wei. *Boundary Layer Solutions in the Gierer-Meinhardt System with Inhomogeneous Boundary Conditions*. Physica D, 429 (2022).
- [6] D. Gomez, S. Iyaniwura, F. Paquin-Lefebvre, M. Ward. J. *Pattern Forming Systems Coupling Linear Bulk Diffusion to Dynamically Active Membranes or Cells*. Phil. Trans. R. Soc. A, 379(2213) (2021).
- [7] D. Gomez, J. Wei. *Multi-spike Patterns in the Gierer-Meinhardt System with a Nonzero Activator Boundary Flux*. J. Nonlinear Science, 31(37) (2021).
- [8] D. Gomez, M.J. Ward, J. Wei. *An Asymptotic Analysis of Localized Three-Dimensional Spot Patterns for the Gierer–Meinhardt Model: Existence, Linear Stability, and Slow Dynamics*. SIAM J. Appl. Math., 81(2) (2021).
- [9] D. Gomez, L. Mei, J. Wei. *Hopf bifurcations from spike solutions for the weak coupling Gierer-Meinhardt system*. Europ. J. Appl. Math, 32(1) (2021).
- [10] D. Gomez, M.J. Ward, J. Wei. *The linear stability of symmetric spike patterns for a bulk-membrane coupled Gierer-Meinhardt model*. SIAM J. Appl. Dyn. Sys., 18(2) (2019).
- [11] D. Gomez, L. Mei, J. Wei. *Stable and unstable periodic spiky solutions for the Gray-Scott system and the Schnakenberg system*. J. Dyn. Diff. Equat., 32 (2019).
- [12] K. Colville, D. Gomez, J. Szmigielski. *On isospectral deformations of an inhomogeneous string*. Commun. Math. Phys., 348 (2016).
- [13] D. Gomez, A.F. Cheviakov. *Asymptotic analysis of narrow escape problems in nonspherical three-dimensional domains*. Phys. Rev. E, 91 (2015).
- [14] D. Gomez, H. Lundmark, J. Szmigielski. *The Canada Day Theorem*. Electron. J. Combin., 20(1) (2013).

## Preprints

- [15] D. Gomez, S. Lawley. *First Hitting Time of a One-Dimensional Levy Flight to Small Targets*. (2023).
- [16] D. Gomez, M. De Medeiros, J. Wei, W. Yang. *Spike solutions to the supercritical fractional Gierer-Meinhardt system*. (Accepted for publication in Journal of Nonlinear Science).

## Invited Talks

- CAIMS Annual Meeting | Kingston, Ontario (June, 2024)
- SIAM Conference on the Life Sciences | Portland, OR (June, 2024)
- Joint Mathematics Meeting | San Francisco, California (January, 2024)
- Computational Analysis Seminar | Vanderbilt University (December 2023)
- Applied Mathematics Colloquium | University of Colorado Boulder (October, 2023)
- Penn-Meiji Workshop on Mathematical Biology | University of Pennsylvania (September 2023)

- SMB Annual Meeting | Ohio State University (July, 2023)
- Mathematical Biology Seminar | New Jersey Institute of Technology (November, 2022)
- PDE and Applied Math Seminar | University of California Riverside (May, 2022)
- CAIMS Annual Meeting | Virtual (June, 2021)
- SIAM Conference on Applications of Dynamical Systems | Virtual (May, 2021)
- PIMS Workshop on New Trends in Localized Patterns in PDEs | Virtual (May, 2021)
- Dynamics Days Digital | Virtual (August, 2020)
- Mathematical Biology Seminar | University of Pennsylvania (January, 2020)
- SIAM Conference on Applications of Dynamical Systems | Snowbird, Utah (May, 2019)
- Workshop on Emerging Areas in Reaction-Diffusion Systems | East China Normal University (April, 2019)
- SIAM Pacific Northwest Chapter Meeting | Oregon State University (October, 2017)
- CAIMS Annual Meeting | Dalhousie University (July, 2017)
- Workshop on Pattern Formation | Dalhousie University (July, 2015)
- CMS Winter Meeting | Ottawa, Ontario (2013)
- Applied Mathematics and Mathematical Physics Seminar | University of Saskatchewan (August, 2013)

## Teaching Experience

- Sep 2023 - May 2023** Numerical and Applied Analysis II (AMCS 6035)  
University of Pennsylvania, Philadelphia, PA  
\*Co-taught with Y. Mori, D. Cooney, and H. Kim.
- Aug 2022 - Dec 2022** Numerical and Applied Analysis I (AMCS 6025)  
University of Pennsylvania, Philadelphia, PA
- Aug 2021 - Dec 2021** Vector Calculus (MATH 114)  
University of Pennsylvania, Philadelphia, PA
- Sep 2018 - Dec 2018** Differential Calculus (MATH 110)  
University of British Columbia, Vancouver, BC

## Colloquium and Minisymposium Organizer

- Mathematical Biology Seminar (with A. Théry) | University of Pennsylvania (Fall 2022, Spring 2023, Fall 2023).
- SMB 2023 Annual Meeting (with K.Y. Lam and Y. Jin) | Ohio State University (July, 2023)
- AMS Western Sectional (with H. Kim, D. Cooney) | University of Utah (October, 2022)

## Honors and Awards

- Departmental Good Teaching Award (AMCS 6025), University of Pennsylvania (2022)
- NSERC Postdoctoral Fellowship (2021-2022)
- UBC Mathematics Graduate Research Award (2019)
- SIAM Student Travel Award (2019)
- NSERC Canada Graduate Scholarship Doctorate Award (2017-2020)
- UBC Four Year Fellowship (206-2020)
- NSERC Canada Graduate Scholarship Master's Award (2014)
- NSERC Undergraduate Student Research Award (2011,2012,2013)