

# Brittany J. Leathers

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## Education

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### University of California, Davis

Ph.D., Applied Mathematics 2022

Emphasis: Numerical methods; Advisor: Robert Guy

Master of Science, Applied Mathematics 2019

Emphasis: Numerical methods; Advisor: Robert Guy

### Yale University

Bachelor of Arts 2010

Majors: Mathematics, Economics

## Professional Experience

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### DIRAC-RTG Postdoctoral Researcher/Lecturer

Applied Mathematics Department, University of California, Merced 2022-present

Mentor: Shilpa Khatri

## Research Interests

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**Numerical Methods:** immersed boundary methods, boundary integrals, and regularized integral methods

**Fluid Dynamics:** fluid-structure interactions with rigid, elastic, and permeable objects or boundaries; organism locomotion

## Grants and Awards

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2024 Selected and funded for **ICERM's Empowering a Diverse Computational Mathematics Research Community**

Project: Modeling and Numerical Simulations of Microswimmers in Confined Domains  
Institute for Computational and Experimental Research in Mathematics, Brown University

2024 **SIAM Early Career Travel Award**

2024 **Excellence in Service Award**

University of California, Merced

2022-2023 **Grant Submitted as co-principal investigator**

NSF Computational Mathematics: Collaborative Research: Immersed Boundary Double Layer Method and Applications  
Co-PIs: Robert Guy, Amneet Pal Bhalla; Senior Personnel: Shilpa Khatri  
Status: Declined

- 2021      **Graduate Student Travel Award**  
University of California, Davis
- 2021      **SIAM Student Travel Award**
- 2013      **Finalist for West Coast Most Valuable Tutor**  
StudyPoint, a private tutoring company
- 2012      **Award for Innovative Expertise**  
Tutorpedia, a private tutoring company

## **Leadership and Service**

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- 2024      **Co-Organizer**, SIAM Life Sciences Minisymposium: Numerical Methods in Biological Fluid Dynamics
- 2024      **Co-organizer**, [UC Merced Fluids in Yosemite Conference](#)
- 2024      **Co-Organizer**, UC Merced Energy and Environment Seminar
- 2023-2024      **Co-Organizer**, UC Merced Applied Math Seminar
- 2022      **Co-Organizer**, SIAM CSE Minisymposium: Immersed Boundary and Related Methods: Advances in Methodology and Biological Applications
- 2021      **Co-Organizer**, UC Davis Math Conference
- 2021      **Secretary**, Association for Women in Mathematics UC Davis Student Chapter
- 2011-2020      **Alumna Interviewer**, Yale College Undergraduate Admissions

## **Presentations**

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### **SIAM Conference on the Life Sciences**

*Numerical Methods for Mixing Analysis in Pulsing Xeniid Coral*. Portland, Oregon, June, 2024

### **UC Santa Barbara Applied Math/PDE Seminar**

Invited Talk: *The Immersed Boundary Double Layer Method for Incompressible Flows with Rigid Bodies*. Santa Barbara, May, 2024

### **APS Division of Fluid Dynamics**

*An Immersed Boundary Method for Double Layer Integral Equations*. Washington, D.C., November, 2023

### **UC Merced Energy and Environment Seminar**

*An Immersed Boundary Method for Double Layer Integral Equations: Collocated vs. MAC Grid Implementations for Finite Differences*. Merced, CA, October, 2023

**Southern California Applied Mathematics Symposium**

*The Immersed Boundary Double Layer Method for Flows with Rigid Bodies.* Irvine, CA, April, 2023

**SIAM Conference on Computational Science and Engineering**

*The Immersed Boundary Double Layer Method for Flows with Rigid Bodies.* Amsterdam, Netherlands, February, 2023

**UC Merced Energy and Environment Seminar**

*An Immersed Boundary Method for Double Layer Integral Equations.* Merced, CA, October, 2022

**UC Merced Applied Mathematics Department Retreat**

*An Immersed Boundary Method for Double Layer Integral Equations.* Merced, CA, August, 2022

**UC Davis Exit Seminar**

*The Immersed Boundary Double Layer Method.* Davis, CA, July, 2022

**SIAM Conference on Computational Science and Engineering**

*An Immersed Boundary Method for Double Layer Integral Equations.* Virtual, March, 2021

**UC Davis: Math and Applied Math Graduate Student Seminar**

*An Immersed Boundary Method for Double Layer Integral Equations.* Davis, CA, February, 2021

**Publications**

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2024 [B. Leathers, R. Guy. \*Immersed boundary double layer method: An introduction of methodology on the Helmholtz equation\*, \*Journal of Computational Physics\*, 506 \(2024\), 112922.](#)

2022 [B. Leathers, \*The Immersed Boundary Double Layer \(IBDL\) Method\*. PhD Thesis. University of California, Davis. ProQuest, Order No. 29326648 \(2022\).](#)

Papers In Preparation .....

2024 B. Leathers, S. Khatri, R. Guy. The immersed boundary double layer (IBDL) method for incompressible flows with rigid bodies.

2024 B. Leathers, S. Malone, G. Hobson, L. Miller, K. Mitchell, S. Khatri. Mixing analysis and parameter study for tension driven pulsing Xeniid coral model.

Projects In Progress .....

2024 O. Lewis, B. Leathers, R. Guy. Immersed Boundary Single Layer method for Neumann and Robin boundary conditions and applications to reaction-diffusion problems.

2024 R. Cortez, S. Khatri, M. Kubacki, K. Kurianski, B. Leathers, T. Pendleton, W. Strychalski. Method of regularized stokeslets with source doublets for volume conservation and modeling permeable membranes.

## Teaching

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### Instructorships – UC Merced .....

- 2024 MATH 22 – Calculus II for Physical Sciences and Engineering
- 2024 MATH 126 – Partial Differential Equations
- 2023 MATH 146 – Numerical Linear Algebra
- 2022-2023 MATH 12 – Calculus II

### Instructorships – UC Davis .....

- 2021 MAT 128A – Numerical Analysis
- 2019 MAT 22B – Differential Equations
- 2017 MAT 21B – Integral Calculus
- 2016 MAT 16B – Short Integral Calculus

## Outreach

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- 2020 **Association for Women in Mathematics**  
*Davis, CA*  
Mentored undergraduate students
- 2019 **California State Summer School for Mathematics and Science (COSMOS)**  
*Davis, CA*  
Taught and guided students through math projects in a residential program for motivated high school students to learn STEM subjects not traditionally offered in high school
- 2009 **Building Bridges**  
*Pengzhou, Sichuan, China*  
Commenced a program to bring STEM and English material to elementary students living in an earthquake-devastated town. The program would continue with local high school volunteers from Chengdu Foreign Language High School.
- 2008-2009 **America Counts**  
*New Haven, CT*  
Led after-school math enrichment programs for elementary students
- 2008 **Joy in Action**  
*Xiao Shui Tang, Yunnan, China*  
Traveled to a village affected by Hansen's Disease (leprosy) to help them construct a road to a nearby town to ease the movement of crops. Our purpose was also to help eradicate the stigma of leprosy and demonstrate to local residents that they need not fear exposure.