University of North Carolina at Chapel Hill
Mathematics Department
Chapel Hill, NC 27599
(919) 525-8577
https://github.com/labdala
https://bit.ly/laryssaabdala
laryssa@live.unc.edu | la.abdala@gmail.com

Laryssa Abdala

Ph.D. Candidate in Applied Mathematics

Summary

Experienced applied math Ph.D. candidate with a 7-year background in mathematical and computational modeling. Adept at utilizing analytical skills to tackle real world issues, particularly in healthcare. Successful in building community and working as a team. Seeking a full-time position commencing in Fall 2024.

Education

Ph.D. in Applied Mathematics 2019-2024 (expected)
University of North Carolina at Chapel Hill, NC, USA
Dissertation Advisor: Boyce Griffith

- Research: Electro-fluid-mechanical models of the human heart in health and disease.
- Coursework: scientific computation, introduction to machine learning, applied statistics, introduction to statistical modeling, numerical ODEs and PDEs, computational modeling laboratory, computational and experimental models of prosthetic heart valves

Graduate Certificate in Big Data in the Context of Biomedical Science 2021
University of North Carolina at Chapel Hill, NC, USA

M.Sc. in Applied Mathematics 2016-2018
University of Campinas, Brazil. Dissertation: "Heart chamber modeling using Navier-Stokes equations"

B.Sc. in Mathematics 2011-2016
University of Campinas, Brazil. Emphasis in Mathematical Physics

Experience

Graduate Research Assistant 2019 - present
Cardiovascular Modeling and Simulation Laboratory, UNC, Chapel Hill, USA

- Creating patient-specific models of the human heart to better understand its behavior in health and in disease.
- Developing the Whole Heart Electrophysiology Library , a deal.II-based library which will be integrated into the open-source IBAMR software infrastructure. The code is written in C++, uses MPI and PETSc. Simulations are run on Red Hat enterprise Linux computer cluster.

Research and Development Intern with the Medical Computing Team Summer 2022
Kitware

- Developed a Bootstrap UI for the Insight Toolkit (ITK) Viewer released as an NPM package, which became the default viewer for ITKWidgets. Its clean design is inspired in the PyData Sphinx theme.
- Worked in Javascript, React JS, CSS, Python, Git and Github Actions. Documentation using Read the docs, Sphinx, and MyST.

Information Technology Intern Summer 2015
Statoil, Bergen - Norway.

- Analyzed and manipulated the internal database of the Beyond WIKI system. Created a website to organize institutional information for the employees.

Skills

Programming languages: C++, Matlab, Python, Shell scripting, Javascript, React JS, R

Meshing and visualization softwares: Paraview, Meshmixer, Coreform Cubit, fTetWild, Blender

Linear algebra and finite element libraries: PETSc, LAPACK, LibMesh, Deal II

Python libraries: NumPy, SciPy, Pandas, Matplotlib

High performance computing: MPI, Slurm workload manager

Version Control, CI, CT, and CD: Git, CMake, Github Actions

Distinctions & Awards

- Master's Thesis commendation 2019
- Poster recognition at Brazilian National Conference on Computational and Applied Mathematics (CNMAC) 2018. "Computational model of a heart chamber through Navier-Stokes Equation". Ranked as one of the top four by the public.
- São Paulo Research Foundation (FAPESP) Master Thesis Fellowship, 2017-2018
- Science Without Borders Program (CAPES). Scholarship to study at University of Bergen (UiB), Norway, 2014-2015

Selected Teaching Experience

Recitation Leader

- Math 231: Calculus I, UNC Chapel Hill — Spring 2023
- Math 233: Calculus III honors and non-honors version, UNC Chapel Hill — Fall 2022

Instructor

- Math 383L: Differential Equations Lab, UNC Chapel Hill — Fall 2021, Fall 2022
- Topics in General and Experimental Physics, Paulista University — Spring 2019
- Basic Electricity, Paulista University — Spring 2019
- Fluid Mechanics: Theory and Laboratory, Paulista University — Spring 2019

Undergraduate Teaching Assistant

- Linear Algebra, University of Campinas — Spring 2013, Fall 2018

Software Development

- Ph.D. thesis (C++): Whole Heart Electrophysiology Library
- Carolina Data Challenge Hackathon (Jupyter notebook) - second place winner 2023: Hacking into a dataset to find health disparities and bias
- R&D internship with Medical Computing Team at Kitware 2022 (Javascript, React, Python): ITK Viewer, ITK Widgets
- M.Sc. thesis (Fortran 90) - honorable mention thesis award 2018: Heart chamber modeling using Navier-Stokes equations

Selected Publications

Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium, *Frontiers in Physiology,* 1471, DOI:10.3389/fphys.2022.912947

"A Pipeline for Automated Coordinate Assignment in Anatomically Accurate Biventricular Models", *Computational Physiology. Springer, Cham*, 1-11, DOI:10.1007/978-3-031-05164-7_1

Heart chamber modeling using Navier-Stokes equations: Modelo computacional de uma câmara do coração a partir das equações de Navier-Stokes, University of Campinas. DOI:10.47749/T/UNICAMP.2018.1080794

Selected Presentations

Computational Fluids Conference (CFC), Cannes, France — April 2023
Oral presentation:"Fluid-Structure Interaction Model of the Human Heart"

Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3c), Cambridge, MA — June 2022
Poster presentation:"Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium"

Extracurricular

Student Volunteer at Supercomputing Conference (SC23), Denver, CO — Nov 2023

Simula Summer School in Computational Physiology — June-Aug 2021
Collaboration between Simula, Norway, and University of California at San Diego.
Project: A Pipeline for Automated Ordinate Assignment in Anatomically Accurate Biventricular Models.

Volunteer bicycle mechanic — Feb-Sept 2021
The ReCYCLEry NC