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Laryssa Abdala

Ph.D. Candidate in Applied Mathematics

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

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

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

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

- Development of a Bootstrap UI for the Insight Toolkit (ITK) Viewer released as an NPM package.
- Worked in Javascript, React JS, CSS, Python, Git and Github Actions. Documentation using Read the docs, Sphinx, and MyST.

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

- Research assistant at the Cardiovascular Modeling and Simulation Laboratory, led by Professor Boyce Griffith.
- Working in C++ with simulations run on Red Hat enterprise Linux computer cluster. Simulations are run using MPI, PETSc, Libmesh, Deal.II and IBAMR.

Information Technology Intern Summer 2015
Statoil, Bergen - Norway.

- Analysis and manipulation of the internal database of the Beyond WIKI system.

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: Git

CI, CT, and CD: 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 fifteen in the Session of the General Panels among the 126 presented. 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

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
- Topics in Mathematics, Paulista University — Spring 2019
- Basic Electricity, Paulista University — Spring 2019
- Fluid Mechanics: Theory and Laboratory, Paulista University — Spring 2019

Undergratuate Teaching Assistant

- Linear Algebra, University of Campinas — Spring 2013, Fall 2018
- Analytic Geometry, University of Campinas — Spring-Summer 2016
- Calculus I, University of Campinas — Fall 2015

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): ITK Viewer
- R&D internship with Medical Computing Team at Kitware 2022 (Python): ITK Widgets
- M.Sc. thesis (Fortran 90) - honorable mention thesis award 2018: Heart chamber modeling using Navier-Stokes equations

Selected Publications

Paper — 2022

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

MSc Dissertation — 2018

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) — April 2023

Cannes, France
Oral presentation:"Fluid-Structure Interaction Model of the Human Heart"

Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3c) — June 2022

Cambridge, Maryland
Poster presentation:"Rule-based Definition of Muscle Bundles in Patient-Specific Models of the Left Atrium"