LUCAS SCHMIDT F. DE ARAUJO

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Nuclear Engineering Department, Polytechnics School UFRJ

EDUCATION

Elementary School *2010-2013*
Colégio Pedro II, São Cristóvão Campus
Colégio Pedro II, Centro Campus

High School *2014-2016*
Colégio Militar do Rio de Janeiro

Bachelor *2017 - 2023*
Nuclear Engineering, POLI-UFRJ

Master *2024 - Currently*
Applied Mathematics, Wrocław University of Science and Technology
(NAWA Scholarship holder)

COMPUTER SKILLS

Programming Languages :

*** Python (Libraries : Numpy, Scipy, MatplotLib,FEniCS, Pandas, SfePy, Urlib , Seaborn , Plotly , Scikit-Learn)**

*** R (Libraries: Tidyverse , Dplyr)**

*** C++ (Libraries: algorithm , math , ROOT , LAPACK , BLAS , OpenMP)**

*** CMake**

*** Julia**

OS : Linux and Windows
Softwares: Office, LibreOffice (Linux), LaTeX, Matlab, Octave

EXPERIENCE

Software Developer: ***Brazilian National Agency for Petroleum, Natural Gas and Biofuels - 2023***

*** Identification of Two-Phase Flow Pattern**

*** Transient Gas-Liquid Flow modeling**

*** Numerical methods for Partial Differential Equations**

*** Riemann Solvers for Conservation Equations(Isothermal and Non-Isothermal models for Two-Phase Flow)**

*** High Resolution Schemes(ROE's Scheme)**

*** Spectral Methods for Fluid Dynamics**

*** C++ mathematical model implementation using parallel computing**

Quantitative Research Intern: ***BOCOM BBM - 2022***

*** Modeling of observable variables at Brazilian energy market**

*** Mathematical Modeling of binary variables**

*** Creation of scheduled routines in Python and R for data updating and models feeding**

ADDITIONAL ACTIVITY

Research Assisting :
Thermodynamic Entropy and Statistical Entropy **- Oriented by Felipe Siqueira Rosa (Physics Institute)** ***2018***
Simplified Models for Casimir Forces **- Oriented by Felipe Siqueira Rosa (Physics Institute)** ***2019***
Why are Casimir Forces so Often Finite? **- Oriented by Felipe Siqueira Rosa (Physics Institute)** ***2020***
SIR modeling for COVID-19 outbreak **- Oriented by Nilson Costa Roberty (Nuclear Engineering Department)** ***2020***

The Neutron Branching Process and Simulation in C++ **- Oriented by Nilson Costa Roberty (Nuclear Engineering Department)** ***2021***
Techniques on Nuclear Magnetic Resonance **- Oriented By Felipe Siqueira Rosa** ***2021***

Events Participation :
Neclear Engineering Week, UFRJ ***2017-2019***
Academical Integration Week ,UFRJ ***2018-2019***
Trends in Radiopharmaceuticals (International Atomic Energy Agency), Vienna ***2019***

Projetcs:
Data Monitoring System and Parameters Estimation for COVID-19 Outbreak ***2020***

Generator Project. A Branching Process simulator in a multiplicative medium. Implemented in C++ and Python.

BACHELOR FINAL PROJECT

THE ONE-POINT BRANCHING PROCESS SIMULATION
The work investigates, in the beginning, the topological aspects of tree graphs, resulting in their isomorphic properties. In the second part, Forward and Backward Kolmogorov equations are derived based on the composition of basic events in the Branching Process, resulting in the main equations for extinction probabilities in a multiplicative medium. The implications of these probabilities in nuclear reactor criticality are discussed. The work concludes with the validation of the results in the second part, making use of the codes implemented in the Generator Project, developed in C++ using OpenMP and

ROOT libraries for high-performance simulation of the Branching Process. *2023*

PUBLICATIONS

*** DE ARAUJO, Lucas Schmidt Ferreira; ROBERTY, Nilson Costa. The neutron one-point branching process simulation. Nuclear Engineering and Design, v. 419, p. 112937, 2024.** *2024*

*** de Abreu, W. V., Maciel, J. M., Martinez, A. S., Gonçalves, A. D. C., Schmidt, L. (2022). Doppler Broadening of Neutron Cross-Sections Using Kaniadakis Entropy. Entropy, 24(10), 1437.** *2022*

*** ROBERTY, Nilson C.; DE ARAUJO, Lucas SF. SIR model parameters estimation with COVID-19 data. Journal of Advances in Mathematics and Computer Science, v. 36, n. 3, p. 97-117, 2021.** *2021*

ACADEMICAL AWARDS

Honors at SIAC for the work Simplified Models for Casimir Forces (Academic Integration Week at UFRJ) *2019*
Finalist at World Nuclear University Olympiad in Vienna *2019*
Section Best Work for SIR modeling for COVID-19 outbreak *2020*

LANGUAGES

Portuguese
English: Writing, Reading , Listening and Speaking (C1)
Francês: Writing, Reading , Listening and Speaking (B1)