Amir M. Gholizad | CV

Memorial University of Newfoundland – Department of Physics

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RESEARCH INTERESTS

- Econophysics
- Bohmian Mechanics
- Quantitative Finance
- Computational Physics
- Deep Learning (CNN/RNN/LSTM/Transformers)

EDUCATION

- **Master of Science** 2022 – 2024
  Memorial University of Newfoundland *St. John's, NL, Canada*
  - Physics
    - GPA: 3.66/4
    - Thesis: Applications of Bohmian Quantum Mechanics in Financial Modelling
      - Supervisors: Dr. James LeBlanc, Dr. Emmanuel Haven
- **Bachelor of Science** 2016 – 2021
  Amirkabir University of Technology *Tehran, Iran*
  - Physics
    - GPA: 15.93/20 (3.24/4)
    - Thesis: Recent progress in Econophysics and its achievements
      - Supervisor: Dr. Mohammadhosein Razbin

HONORS

- Granted admission with full fund scholarship from the Memorial University of Newfoundland. 2022 – 2024
- Ranked top 2% among 162,000 students in the nationwide university entrance exam. 2016
- Granted admission with full fund scholarship from the Amirkabir University of Technology 2016 – 2021 (**2nd** ranked university in Iran, based on QS Rankings).

EXPERIENCE

- **Teaching Assistant** Fall 2022 – Present
  PHYS 1021 / PHYS 1050
  - Facilitated and supervised laboratory sessions for undergraduate students, ensuring adherence to safety protocols and providing guidance on experimental procedures.
  - Assisted students in understanding and applying fundamental principles of physics through hands-on experiments and demonstrations.
- **Teaching Assistant** Fall 2020
  Solid State Lab
  - Prof. Kavoos Mirabbaszadeh (supervisor), Dr. Mahboobeh Setayeshmehr (instructor)
    - Prepared a handbook for the Solid State Physics Laboratory course including instructions for laboratory instruments and the experiments,
    - Tested laboratory equipment by performing expected experiments based on the course syllabus.

PROJECTS

- **Supervised Machine Learning Algorithm for Fluid Flow Modelling (Data Driven Fluid Mechanics)**
  - Investigated the behavior of a fluid using Proper Orthogonal Decomposition (POD) and Dynamic Mode Decomposition (DMD) techniques, specifically focusing on the vorticity field of a two-dimensional flow past a cylinder at a Reynolds number of 200.
  - Utilized a combination of POD and DMD methods to anticipate the future modes of the fluid flow, allowing for a deeper understanding of its dynamics and potential predictions.
- **Maximum Likelihood Estimators of Weibull and Uniform Distributions**
  - Explored and analyzed the Weibull and Uniform probability distributions, focusing on understanding their properties and characteristics.
  - Developed, debugged, and compared multiple numerical and analytical methods for computing Maximum Likelihood Estimators (MLEs) for the Weibull and Uniform distributions.
  - Used R programming language, to implement and evaluate the effectiveness of various methods and algorithms in analyzing these distributions and estimating their parameters.
- **Solving the Schrödinger equation for Hydrogen atom using numerical methods**
  - A complete numerical solution to the Schrödinger equation in a 3D-Spherical space for Hydrogen atom by using Runge-Kutta numerical method.
  - Achieved results fairly similar to analytical ones.
  - Plotted separated spherical harmonics and radial functions of different energy states of the H^1 atom.
- **Numerical solution to the kinetics of breakable filament assembly (Protein Misfolding)**
  - Presented a numerical treatment of a set of coupled kinetic equations that govern the self-assembly of Misfolded Proteins.
  - Solved PDE equations of filamentous structures' kinetic using Runge-Kutta numerical method and Python programming language.
  - Achieved results similar to the Analytical method.
- **Simulating Thermal Fluctuations of an Actin Filament**
  - Investigated thermal fluctuations of filamentous structures, in this case, actins,
  - Used Monte Carlo method to simulate thermal behavior of actins.
- **Sedimentation process as an example of Brownian Motion**
  - Simulated the settlement process for a set of identical particles dissolved in water,
  - Animated the experiment to re-discover affecting factors of sedimentation process,
  - Used Brownian Motion formulation to study the case.
- **Simulation of the Rössler attractor as a chaotic system**
  - Presented an example of chaotic behavior for a particular system,
  - Reviewed some basic dynamical properties of the Rössler system such as chaotic behavior of the attractor, sensitivity analysis, variation of parameter, bifurcation diagram and Poincar´e map,
  - Developed an explicit Python algorithm to solve the Rössler system and to analyze its dynamical properties,
  - Plotted phase space of the system for different initial conditions.
- **Comparison of different numerical integration methods**
  - Comparing the speed and accuracy of MonteCarlo, Trapezoidal, and Simpson numerical integration methods.

COURSES

- Academic Courses
  - Scientific Programming
  - Advanced Quantum Mechanics
  - Computer Programming(C/C++)
  - Fundamentals of Numerical Simulation
- Online Courses
  - Quantitative Finance
  - Mathematical Finance
  - Python for Financial Analysis
  - Git Complete
  - Complete Python Bootcamp
  - TensorFlow Develop, Zero to Mastery

SKILLS

Programming/Scripting

- Python
  - Numpy
  - Pandas
  - Matplotlib
  - TensorFlow
- R
- Bash
- LaTeX
- Fortran
- C/C++

IDEs/Tools

- Maple
- RStudio
- PyCharm
- Jupyter Notebook
- VSCode
- Git / GitHub
- Google Colab
- Sublime Text

LANGUAGES

- Persian Native
- English Fluent

  IELTS Overall Band Score: 7.5

References, Further information, and Proofs are available upon Request