Lijie Ding

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Education

Ph.D. (Physics), Brown University   10/16/2022
Dissertation: Chiral Liquid Crystals on Deformable Surfaces: A Monte Carlo Study
Advisor: Robert A. Pelcovits and Thomas R. Powers

B.Sc. (Applied Physics), University of Science and Technology of China   06/19/2017
Thesis: Irreversible Monte Carlo Algorithms
Advisor: Youjin Deng

Industry Experience

Quantitative Strategist at Goldman Sachs   07/18/2022 - present

- Covers bi-monthly Price verification (PV) process for OTC interest rate products (IRP): Bermudan/Midcurve Swaption, Accreting Cancellable Swap, Constant Maturity Swap, Spread Option, Capfloor, Binary etc. Calibrate internal marks of corresponding risk factors using market consensus.
- Develop SOFR based IRP PV model and migrate from existing LIBOR based model: model implementation, testing, result analysis, documentation revision etc. for all OTC IRP.
- Maintain and optimize existing PV models and PV workflows.

Academia Experience

Monte Carlo simulation of chiral fluid membrane   2018-2023

- Designed theoretical *quantitative models* for the colloidal membrane.
- Implemented off-lattice dynamical triangulation simulation from scratch using *C++*.
- Expanded and implemented Lebwhol-Lasher model to the off-lattice setting.
- Carried out simulation on *high performance computing cluster* using *Slurm*, written controlling script using *bash script*.
- Analyzed and visualized data using *Python*, present results to people with different backgrounds.

Controlled DNA Brownian motion using electrokinetic noise   2017-2018

- Proposed and tested the *stochastic process* modeling hypothesis using overdamped Langevin equation for the DNA molecule in the microfluidic channel.
- Designed and implemented *image processing* program for fluorescent DNA molecule tracking and selection, and analyzed *time-series* data using *Python* and *OpenCV*.

Irreversible Monte Carlo algorithms   2015-2017

- Designed state-of-the-art irreversible Monte Carlo *algorithm* that breaks the detailed balance condition using lifting technique and implemented it using *C++*.
- Carried out *efficiency benchmarking* using Sokal's auto-windowing method, and analyzed data using *Python*, up to 14,100% improvement were achieved.

Skills

Programming: C++, Python, Slang, Mathematica, Matlab, Shell, HTML&CSS.
Software&Package: Excel, Blender, Git, OpenFoam, Numpy, Scipy, OpenCV, Matplotlib.
Technical: Complex systems modeling, Statistical algorithms development, Data analysis and visualization.

Selected Publications

1. Lijie Ding, Robert A. Pelcovits, and Thomas R. Powers. Deformation and orientational order of chiral membranes with free edges. Soft Matter, 17:6580–6588, 2021
2. Lijie Ding, Robert A Pelcovits, and Thomas R Powers. Shapes of fluid membranes with chiral edges. Physical Review E, 102(3):032608, 2020
3. Shayan Lameh, Lijie Ding, and Derek Stein. Controlled Amplification of DNA Brownian Motion Using Electrokinetic Noise. Physical Review Applied, 14(5):054042, 2020
4. Eren Metin Elçi, Jens Grimm, Lijie Ding, Abrahim Nasrawi, Timothy M Garoni, and Youjin Deng. Lifted worm algorithm for the Ising model. Physical Review E, 97(4):042126, 2018

Awards and Honors

2021   Physics Dissertation Fellowship, Brown University, U.S.
2016   National Scholarship, Ministry of Education, China
2015   Grand Prize, China Undergraduate Physics Tournament, China
2015   National Scholarship, Ministry of Education, China
2012   Bronze Medal, Chinese Physics Olympiad, China