

SIYAO WANG

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Education

Cuiying Honors College(CHC), Lanzhou University(LZU)

Sep. 2019 - Jun. 2023

BSc with Honors in Mathematics and Applied Mathematic

- Candidate of China's Top-Notch Undergraduate Training Program—Cuiying Honors College
- Overall Score: 90.15/100.00, Rank: **6/159** (Top **3%**)
- Related Course
 - Math: Mathematics Analysis(Advanced Calculus) (92), Advanced Linear Algebra (91,94, 1/160), Theory of Probability (88), Operational Research (98), Numerical Analysis I (99, 1/155), Elementary Number Theory, Statistical Inference, Real Analysis(Measure theory and Lebesgue Integral) (94, 3/157), Abstract Algebra (97), Mathematical Modeling (97, 1/142), Numerical Analysis II(Numerical Solutions of Differential Equations) (95), Introduction to Commutative Algebra (97), Differential Geometry (95)
 - CS: C Programming, LINUX Operating System and Python Language Programming (94), GPU Super-computing Algorithm and Parallel Technology(CUDA) (A+), MATLAB Programming

Honors and Awards

Contemporary Undergraduate Mathematical Contest in Modeling, Provincial First Prize (2/3000)	Feb. 2022
National College Students Mathematical Competition, Provincial Second Prize (Top 1%)	Dec. 2021
COMAP's Mathematical Contest in Modeling, Meritorious Winner (Top 3% globally)	May. 2022
First-class Scholarship for Outstanding Students, LZU, Ranked 4/160	Dec. 2020
Outstanding Project of Summer Social Practice, Provincial Outstanding Recognition	Feb. 2022
Men's 100m sprint in Lanzhou University Athletics Competition, Silver Medal (11"80)	May. 2021
Men's 200m sprint in Lanzhou University Athletics Competition, Bronze Medal (24"28)	May. 2021
Merit student recognition in Lanzhou University (Top 1%)	Dec. 2020

Research Projects

Infectious Diseases Model Based on Dynamical System Model with Migration and Periodic Pulse Inoculation Effects

Project Member, advised by Prof. Wantong Li, School of Mathematics and Statistics, LZU Feb. 2021 - Mar. 2022

- Proposed the SIVS model of two cities by adding the effects of periodic pulse inoculation and population migration to the traditional SIR model
- Obtained and visualized the numerical solution of the equation using MATLAB; divided the solutions into "disease-free equilibrium" and "endemic equilibrium" according to whether the disease will be extinct in the stable state
- Found the analytic solution for disease-free equilibrium; analyzed its stability using Lyapunov's second theorem
- Predicted the disease trends based on the model; provided practical strategy on the prevention and control of the disease

Shape Optimization of "FAST" Active Reflector panels Based on Target Planning and Particle Swarm Algorithm

Project Leader, advised by Lecturer. Yuewei Liu, School of Mathematics and Statistics, LZU Oct. 2021

- Determined the ideal paraboloid position of the "FAST" active reflector panels in the operating state using space analytic geometry, according to the spherical position in the idle state
- Derived the actual working paraboloid position by constructing the target planning model under the constraints of the cable nodes' adjustment range on the panels; Invoked particle swarm algorithm to solve the model
- Applied the model to observe celestial body at a particular location and calculated the ratio of the reflected signal to the received signal of the receivers
- Awarded the **First Prize** of Contemporary Undergraduate Mathematical Contest in Modeling

Optimal Power Allocation Model for Different types of Cyclists

Project Leader, advised by Lecturer. Dongbin Jiao, School of Information Science and Engineering, LZU Feb. 2022

- Fitted the power profiles (indicates how long a rider can produce a given amount of power) for different types of cyclists

using the hyperbolic model after a thorough review of the literature on kinematics physics to characterize their unique ability

- Derived the ordinary differential equations for cyclists' power and riding velocity from the dynamic analysis of cyclists
- Developed and solved a planning model targeting the shortest time for 2021 Tokyo Olympic Time Trial course under the constraints of sharp turns velocity and sprint limits
- Tested the robustness and stability of the model by adding the influence of $\pm 3m/s$ wind velocity as well as calculating the time taken for the power distribution to deviate 10% from the ideal model
- Applied the model to team cycling races to analyze the time used in different team synergy modes
- Awarded as the **Meritorious Winner** of the COMAP's Mathematical Contest in Modeling

Generating Function of Variable Exponential Fractional Order Differential Operators(VEFODO) based on the Fractional Fokker-Planck Equation (WIP)

Project Leader, advised by Prof. Weihua Deng, School of Mathematics and Statistics, LZU Feb. 2022 - Nov. 2022

- Using generating function to derive the numerical calculation format of VEFODO for numerical computation of Fodder-Planck equation
- Will analyze the stability and convergence speed of the numerical calculation format

Skills

- Coding : C/LaTeX/Python/MATLAB(advanced), C++/Linux/UNIX(intermediate)
- Language : Mandarin(native), English, CET6: 548 (W: 173)

Leadership and Extra-curriculum

President of Student Union, Cuiying Honors College(CHC)

Sep. 2020 - Jun. 2023

- Coordinated the cooperation of **9** departments with **70** members of the CHC Student Union
- Hosted the annual national student innovation project defense venue, with the engagement of **100** students in CHC annually, contacted the judges in advance, maintained the order of the venue

Vice-Captain of Track and Field Team, LZU

Mar. 2021 - Aug. 202

- Won **Silver Medal** of Men's 100m sprint in Lanzhou University Athletics Competition, 2021, reached the standard of **China National Second Level Track & Field Athletes in 100m sprint. (11"80)**

Voluntary Work

Volunteers of Gansu University Volleyball League

22hrs.

- Involved in the closing ceremony of the volleyball league as the closing flag bearer of LZU and guided students from over 50 universities in Gansu to their designated positions.
- Made preparation for the competition venue and provided regular supplies for more than 1000 athletes.

Cuiying Prestigious Figures Recording Voluntary Program

over 100hrs.

- Subtitled the accumulated 80mins. interview videos of figures who are prestigious professors or alumni in LZU.
- Documented and published to the stories of figures in LZU from all walks of life.

科研项目

基于具有迁移和周期性脉冲接种效应的动态系统模型的传染病模型创新研究

2021年2月-2022年3月

兰州大学数学与统计学院

教授 李万同

- 1. 创造性地修改了传统的SIR模型，考虑了定期脉冲接种和两地人口迁移的影响，提出了两地的SIVS模型。
- 2. 用MATLAB对上述方程进行数值求解和可视化，根据传染病在稳定状态下是否会灭绝，将解分为“无病均衡点”和“流行均衡点”。
- 3. 找到无病平衡的解析解，并利用李亚普诺夫第二定理分析其稳定性。
- 4. 在此基础上对疾病趋势进行预测，并对疾病的预防和控制提供实用策略。

基于目标规划和粒子群算法的“FAST”主动反射板形状优化研究

2021年10月

兰州大学数学与统计学院

讲师 刘岳巍

- 1. 根据空闲状态下面板的球体位置，利用空间解析几何学确定了“FAST”有源反射板在运行状态下的理想抛物面位置。
- 2. 考虑到面板上电缆节点调整范围的限制，构建了目标规划模型，以建立实际的工作抛物面，并调用粒子群算法来解决该模型。
- 3. 应用该模型对特定位置的天体进行观测，并计算出反射信号与接收器接收信号的比值。
- 4. 获大学生数学竞赛建模一等奖，2021年

基于及场地条件及赛道特点的不同类别的自行车手的最佳功率分配模型

2022年2月18日

兰州大学信息科学与工程学院

讲师 焦栋斌

- 1. 利用双曲线模型建立起对于不同种类的自行车手(time triallist sprinter puncher all-rounder)的功率曲线(power profiles)(indicates how long a rider can produce a given amount of power)，并以此表征不同种类自行车手的能力特点。
- 2. 对自行车手进行动力学分析，推演出自行车手骑行所用功率与行驶速度的常微分方程，以及弯道对于自行车手车速的限制；
- 3. 运用运动生理学知识合理化骑手进行冲刺，并在车速与功率限制条件的基础上，对2021 Olympic Time Trial course in Tokyo，以所用时间最短为目标建立规划模型并求解。
- 5. 在风速影响下对上述动力学方程进行修改，计算出模型在 $\pm 3m/s$ 风速的影响下的所用时间，以及功率分配偏移理想模型 $\pm 10\%$ 的范围内的所用时间，以此分析模型的稳健性。
- 6. 最后将模型运用于团队自行车比赛中，具体分析不同团队协同模式下减少的风阻，使模型更具一般性意义。

基于分数Fokker-Planck方程的可变指数分数阶微分算子（VEFOD0）的生成函数

2022年2月-2022年11月

兰州大学数学与统计学院

教授 邓伟华

- 1. 利用生成函数推导出VEFOD0的数值计算格式，用于Fodder-Planck方程的数值计算。
- 2. 将分析该数值计算格式的稳定性和收敛速度。