



科学出版社

一门科学只有在成功地运用数学时，  
才算达到了真正完善的地步。

——马克思



QK1936387

# 数学的实践与认识

MATHEMATICS  
IN PRACTICE AND THEORY

第四十九卷

Vol. 49

第10期

No.10

2019

中国数学会会刊

中国科学院数学与系统科学研究院主办

科学出版社出版

# 数学的实践与认识

2019年第49卷第10期

## 目 次

### 管理科学

基于空间自相关的城市化、经济与生态环境协调发展分析——以新疆巴州地区为例	周玄德, 孜比布拉·司马义, 邓祖涛(1)
共享单车平台定价策略研究	彭 廉, 吕 芸, 刘 红(11)
基于演化博弈的跨境电商物流联盟合作分析	杜志平, 郭承丽, 鲁文豪, 付帅帅(22)
含时变风险厌恶系数的异质信念模型及实证分析	潘正红, 师 恒, 徐燕霞(33)
基于灵敏度分析的职业环境健康综合评价方法	李植花, 赵 昕(42)
基于前景理论的政府和企业扶贫开发行为演化博弈研究	黄海棠, 李登峰, 滕剑仑, 蔡创能, 余高峰(49)
人本城镇化系统建模及仿真分析——基于微观时间配置视角	牛文学, 谢枝花, 黎 伟(62)
非线性灰色 Bernoulli 模型的改进及应用	吴文泽, 张 涛, 江建明(73)
基于改进模糊层次分析法的茶园土壤肥力评价	缪叶曼子, 吴全聪, 李晓丽, 周斌雄(80)
基于 SEM 的建设单位 BIM 应用标准顶层设计研究	李凤娇, 鲁丹丹, 关 罡, 孙钢柱, 张 群(88)
基于演化博弈的防火墙和入侵检测系统配置策略分析	赵柳榕, 朱晓峰(97)
基于随机演化博弈的重大工程项目主体行为博弈及仿真分析	苗军霞, 黄德春, 张长征(106)
老旧小区加装电梯住户间费用分摊补偿研究	刘晓君, 孙勇凯(114)
旅游环境承载力子系统耦合协调关系研究——以兰州市为例	杨秀平, 翁钢民, 潘 越, 侯玉君(122)
北极航线安全演化机制与管理策略	刘同超, 李振福(133)
基于数据包络分析的工程监理评标决策模型研究	方倩如, 方德斌, 何亚伯, 张 浩(143)
经济政策不确定性、区域差异与投资效率——基于固定效应面板模型	许 芳, 余国新(154)
农业科技微信公众号用户采纳行为研究——基于信息系统成功模型与信任理论	顾建强, 薛庆根(162)
基于向量法对国家电网综合运营管理评估	郭 阳, 冯和宁, 孔文佳, 散齐国, 韩宏韬, 陈德良, 贾金柱, 王新民(172)
HJM 模型中的波动率参数估计	刘 燮, 江 良(184)
基于相依风险模型的最优再保险	王春霞, 吴黎军(194)

### 工 程

葡 472 区块油水层判别标准研究	张斌弛, 马世忠, 姜 静, 秦 旗, 何 伟(202)
三元段塞组合结合数值化方案对微观剩余油研究	郑太毅, 孙灵辉, 萧汉敏(212)
基于遗传神经网络的失能老人健康评估	王 帅, 陶晋宜, 杨 刚, 张晓雪(219)
应 用	
一种改进的和声搜索算法求解线性两点边值问题	雍龙泉(226)
具有媒体效应和时滞的反应扩散传染病模型的控制与预测	张丽娟, 王福昌, 赵宜宾, 张锡明(234)
呼包鄂城市群 PM2.5 质量浓度统计分布特性	曹 艳, 彭秀云, 孟 静(244)
对角膨胀双变量 Poisson 回归模型在结核病影响因素分析中的应用	侯 文, 年赛楠, 孟彦彤, 周 令(254)

### 研 究

局部凸分离空间上的 Caratheodory-Hahn-Kluvanek 延拓定理	乌仁其其格, 杨梅荣(262)
预处理 Uzawa 算法及其在求解 Stokes 问题上的应用	孙国卿, 朱晓云, 郑 权(268)
一种多种群综合学习粒子群优化算法	王英伟, 马树才(273)

### 教学研究

具有阶段进程的 SLI 艾滋病模型的全局稳定性	王晓红, 刘桂荣(286)
基于 ARIMA 和 BP 神经网络组合模型的能源消费预测	谢小军, 邱云兰, 时 凌(292)
四川省入境旅游需求组合预测研究	王 洋, 张 萍(299)
半群 $PCS_n$ 的极大子半群	李亚雷, 徐 波, 戴先胜(303)
支持向量机在股指现货和衍生品关系建模中的应用	董子静, 赵朝熠, 石茂国, 郑鹤林(308)

# MATHEMATICS IN PRACTICE AND THEORY

2019 Vol.49 No. 10

## Contents

### Managed Science

- The Analysis of Space Autocorrelation About the Coordination Degree Development Between Urbanization, Economic and Ecological Environment in the Bavaria ..... ZHOU Xuan-de, Zibibula-Simayi, DENG Zu-tao (1)  
A Study of Pricing Strategy on Bicycle-Sharing Platforms ..... PENG Geng, LV Yun, LIU Ying (11)  
Cooperation Analysis of Cross-border E-commerce Logistics Alliance Based on Evolutionary Game Theory ..... DU Zhi-ping, GUO Cheng-li, LU Wen-hao, FU Shuai-shuai (22)  
Heterogeneous Belief Model with Time-varying Risk Aversion Coefficient and Its Empirical Analysis ..... PAN Zheng-hong, SHI Ke, XU Yan-xia (33)  
Comprehensive Evaluation Method of Occupational Environment Health Based on Sensitivity Analysis ..... LI Zhi-hua, ZHAO Xin (42)  
Study on Evolutionary Game of Poverty Reduction and Development Behavior of Government and Enterprise Based on Perspective Theory ..... HUANG Hai-tang, LI Deng-feng, TENG Jian-lun, CAI Chuang-neng, YU Gao-feng (49)  
Modeling and Simulation Analysis of People-oriented Urbanization — Based on the micro individual time configuration Perspective ..... NIU Wen-xue, XIE Zhi-hua, LI Wei (62)  
A Novel Optimized Nonlinear Grey Bernoulli Model And Its Application ..... WU Wen-ze, ZHANG Tao, JIANG Jian-ming (73)  
Evaluation of Quality of Soil in Tea Garden Based on the Improved Fuzzy Analytic Hierarchy Process ..... MIAO Yeminzi, WU quan-cong, LI Xiao-li, ZHOU Bin-xiong (80)  
Research on Top-level Design of BIM Application Standard Based on SEM ..... LI Feng-jiao, LU Dan-dan, GUAN Gang, SUN Gang-zhu, ZHANG Qun (88)  
Analysis of Configuration Strategy of Firewall and Intrusion Detection Systems Based on Evolutionary Game Theory ..... ZHAO Liu-rong, ZHU Xiao-feng (97)  
Risk Behavior Mechanism and Simulation Analysis of Major Projects Based on Stochastic Evolutionary Game Theory ..... MIAO Jun-xia, HUANG De-chun, ZHANG Chang-zheng (106)  
Research on the Cost-sharing Compensation of Old Residential Buildings with Elevator ..... LIU Xiao-jun, SUN Yong-kai (114)  
Research on the Coupling Coordination Relationship of the Internal Subsystem of Tourism Environment Carrying Capacity —Taking Lanzhou city for an example ..... YANG Xiu-ping, WENG Gang-min, PAN Yue, HOU Yu-jun (122)  
Evolution Mechanism And Management Strategy of the Arctic Route Security ..... LIU Tong-chao, LI Zhen-fu (133)  
A DEA-based Evaluation Model of Engineering Supervision Bid ..... FANG Qian-ru, FANG De-bin, HE Ya-bo, ZHANG Hao (143)  
Economic Policy Uncertainty, Regional Differences and Investment Efficiency — Based on the experience data of China's agricultural listed companies ..... XU Fang, YU Guo-xin (154)  
Research on User Adoption Behavior of WeChat Public Accounts of Agricultural Science And Technology — Based on information systems success model and trust theory ..... GU Jian-qiang, XUE Qing-gen (162)  
Evaluation of State Grid Integrated Operation Management System Based on Vector Method ..... GUO Yang, FENG He-ning, KONG Wen-jia, SAN Qi-guo, HAN Hong-tao, CHEN De-liang, JIA Jin-zhu, WANG Xin-min (172)  
An Efficient Analytical Calibration of Volatilities for HJM Model ..... LIU Shen, JIANG Liang (184)  
Optimal Reinsurance Based on Dependent Risk Model ..... WANG Chun-xia, WU Li-jun (194)

### Engineering

- Study on the Distinguishing Standard of Oil and Water Layer in 472 Block ..... ZHANG Bin-chi, MA Shi-zhong, JIANG Jing, Qin Qi, HE Wei (202)  
The ASP Slug Combination and the Micro Residual Oil Displacement Experiment ..... ZHENG Tai-yi, SUN Ling-hui, XIAO Han-min (212)  
The Health Assessment of the Disabled Elderly Based on Genetic Neural Network ..... WANG Shuai, TAO Jin-yi, YANG Gang, ZHANG Xiao-xue (219)

### Applications

- An Improved Harmony Search for Linear Two-Point Boundary Value Problem ..... YONG Long-quan (226)  
Control and Prediction of a Reaction-diffusion Epidemic Model with Media Effect and Time Delay ..... ZHANG Li-juan, WANG Fu-chang, ZHAO Yi-bin, ZHANG Xi-ming (234)  
Statistical Characteristics of PM2.5 Concentration in Hohhot-Baotou-Ordos Region ..... CAO Yan, PENG Xiu-yun, MENG Jing (244)  
Diagonal Inflated Bivariate Poisson Model in Analysis of Influencing Factors of Tuberculosis Application ..... HOU Wen, NIAN Sai-nan, MENG Yan-tong, ZHOU Ling (254)

### Research

- Caratheodory - Hahn - Kluvanek Extention Theorem on Locally Convex Space ..... WuRenQiQiGe, YANG Mei-rong (262)  
The Preconditioned Uzawa Algorithm for Solving the Stokes Problems ..... SUN Guo-qing, ZHU Xiao-yun, ZHENG Quan (268)  
Multi-Swarm Comprehensive Learning Particle Swarm Optimizer ..... WANG Ying-wei, MA Shu-cai (273)

### Teaching Research

- Global stability of a SLI AIDS model with staged progression ..... WANG Xiao-hong, LIU Gui-rong (286)  
Prediction of Energy Consumption Based on ARIMA and BP Neural Network Combined Model ..... XIE Xiao-jun, QIU Yun-lan, SHI Ling (292)  
Research on Demand Forecast of Entry Tourism in Chengdu Based on Combination of Various Models ..... WANG Yang, ZHANG Ping (299)  
Maximal Subsemigroup of the Semigroup  $\mathcal{P}CS_n$  ..... LI Ya-lei, XU Bo, DAI Xian-sheng (303)  
Application of SVM in Modeling the Relationship Between Stock Index Spots and Derivatives ..... DONG Zi-jing, ZHAO Chao-yi, SHI Mao-guo, ZHENG He-lin (308)

# 《数学的实践与认识》编辑委员会

主编：林群

副主编：(以下按姓氏笔划为序)

卢焱 叶其孝 朱广田(常务副主编)

李邦河 汪寿阳 宋春伟 张继平

编委：王术 王冬琳 王建明 龙永红 叶专

史福贵 冯荣权 朱一心 许进 李宁

余志坤 张文岭 林源渠 郑连存 姜启源

骆顺龙 贾仲孝 郭懋正 唐仲伟 黄海洋

常彦勋

## 数学的实践与认识

Shuxue de Shijian yu Renshi

(半月刊)

第49卷

第10期

2019年5月

Journal of Mathematics in Practice and Theory

(Semimonthly)

Vol.49 No.10 May 2019

编 辑 中国数学会

Edited by

Editorial Board of

《数学的实践与认识》编委会

Mathematics in Practice and Theory

北京大学数学科学学院

School of Mathematical Sciences, PKU

邮政编码：100871

Beijing 100871, China

电 话：(86-10)62759981

Tel:(86-10)62759981

电子邮件：bjmath@math.pku.edu.cn

Email:bjmath@math.pku.edu.cn

主 编 林群

Editor in Chief

LIN Qun

主管单位 中国科学院

Superintended by

Chinese Academy of Sciences

主办单位 中国科学院数学与系统科学研究院

Sponsored by

Academy of Mathematics and  
Systems Science, Chinese Academy  
of Sciences

承 办 单 位 中国科学院系统科学研究所

Co-sponsored by

Institute of Systems Science, Academy of  
Mathematics and Systems Science,  
Chinese Academy of Sciences

北京数学会

Beijing Mathematical Society

出 版 社

Science Press

北京东黄城根北街16号

16 Donghuangchenggen North Street,

邮 政 编 码：100717

Beijing 100717, China

印 刷 中国文联印刷厂

Published by

Printing House of Wenlian in China

国 内 发 行 北京市邮局

Printed by

Beijing Post Office

国 外 发 行 中国国际图书贸易总公司

Distributed at Home by

China International Book Trading

(北京399信箱)

Distributed Abroad by

Corporation (CIBTC) P.O.Box 399,

国 内 订 购 全国各地邮局

Beijing, China

网 址 <http://ssjs.cbpt.cnki.net>

Domestic Subscription

All Local Post Office

(如有印装质量问题，印刷厂负责调换电话010-68431909)

ISSN 1000-0984

国外发行代号Q47

ISSN 1000-0984

CN11-2018/O1

国内发行代号2-809

定 价：人民币30.00元



9 771000 098199