

ISSN 1000-1735
CN 21-1192/N

遼寧師範大學學報

JOURNAL OF LIAONING NORMAL UNIVERSITY

自然科學版

NATURAL SCIENCE EDITION

第45卷 第1期

2022年3月



中国科技核心期刊
全国高校优秀科技期刊
“中国期刊方阵”双效期刊
辽宁省一级期刊
辽宁省高校特色科技期刊



目 次

- 某些链环琼斯多项式的零点性质 韩友发, 张宇浓, 燕佳钰, 姜明慧(1)
- 带形状参数的三次三角 DP 曲线的构造 彭兴璇, 王研, 宋九锡(6)
- MPVCC 问题的 M 稳定性的序列最优化条件研究 许娜, 姜姗, 沈洁(13)
- 一类积分算子的有界性 李然, 姜宏升(20)
- ZnO/TiO₂复合薄膜的制备及其光学性能的研究
- 王玉新, 宋欣, 蔺冬雪, 王禄, 王媛媛(25)
- 金红石型二氧化钛薄膜热导率的数值模拟 白素媛, 白容榕, 吴可(31)
- 飞秒激光诱导 Li₂分子的电子-离子动力学的理论研究
- 洪许海, 刘浩然, 赵文杰, 郭强, 谷鑫(38)
- 一种基于超像素合并的高光谱图像谱-空降维方法 谢福鼎, 杨秋艳, 嵇敏(45)
- 基于空谱融合与协同表示的高光谱图像分类算法 刘德山, 丁一民, 闫德勤, 党琦(50)
- 受损腺嘌呤与氨基酸残基堆积复合物的 ABEEM 极化力场
- 刘翠, 王洋, 郑明杰, 尚尉, 郑利(58)

基于模型认知的板块-任务式化学课堂教学设计

——以“金属的腐蚀与防护”为例 王秋，赵书晨，刘国强(65)

京津冀生态宜居与宜业耦合协调发展研究 李雪铭，兰敬伟，田深圳，孙赫，刘贺(72)

辽南黄土晚更新世粒度敏感组分的古环境意义 张威，杨婵玉(83)

辽宁省近 20 年人口变化与经济发展时空演变研究 王亮，邓昭，于文(93)

基于 POI 数据的天津市体育设施空间格局分析 侯英姿，高一冉，王方雄，毕红星(100)

旅游景观文化创意的生产过程及其优化研究 谢春山，张金洋(107)

基于夜间灯光数据的城市经济空间发展格局

——以大连市为例 柯丽娜，王姝婷，阴曙升，王辉，陶拓抒(114)

专项功能性训练促进学龄前儿童(3~6岁)基本动作技能发展的实证研究

..... 谷颖，厉莹睿(123)

11 种体育运动项目对我国学龄儿童工作记忆影响的网状 Meta 分析

..... 张自云，金成吉，解超(135)

期刊基本参数:CN 21-1192/N * 1978 * q * A4 * 144 * zh * P * ¥12.00 * 1300 * 19 * 2022-03

本期执行编辑:候金鑫

**JOURNAL OF LIAONING NORMAL UNIVERSITY
(NATURAL SCIENCE EDITION)**
Vol.45 No.1 2022(SUM 177)

CONTENTS

Properties of zeros of the Jones polynomial of some links

..... HAN Youfa , ZHANG Yunong , YAN Jiayu , JIANG Minghui(1)

Construction of the cubic trigonometric DP curve with shape parameters

..... PENG Xingxuan , WANG Yan , SONG Jiuxi(6)

The sequential optimality condition for M-stationarity for MPVCC

..... XU Na , JIANG Shan , SHEN Jie(13)

The boundedness of a class of integral operators LI Ran , JIANG Hongsheng(20)

Preparation and optical properties of ZnO/TiO₂ composite films

..... WANG Yuxin , SONG Xin , LIN Dongxue , WANG Lu , WANG Yuanyuan(25)

Numerical simulation of thermal conductivity of rutile titanium dioxide film

..... BAI Suyuan , BAI Rongrong , WU Ke(31)

The theoretical study of the electron-ion dynamics of Li₂ molecule induced by femtosecond laser

..... HONG Xuhai , LIU Haoran , ZHAO Wenjie , GUO Qiang , GU Xin(38)

A spectral-spatial dimensionality reduction method for hyperspectral image based on superpixel

merging XIE Fuding , YANG Qiuyan , JI Min(45)

Hyperspectral image classification algorithm based on spatial spectrum fusion and collaborative

representation LIU Deshan , DING Yimin , YAN Deqin , DANG Qi(50)

Development of the ABEEM polarizable force field of stacking damaged adenine and amino acid

residues LIU Cui , WANG Yang , ZHENG Mingjie , SHANG Wei , ZHENG Li(58)

Model-cognition-based design of block-task chemistry classroom instruction

—Taking “corrosion and protection of metals” as an example

..... WANG Qiu , ZHAO Shuchen , LIU Guoqiang(65)

Research on the coordinated development level and spatial difference of ecological livability and employability coupling in Beijing-Tianjin-Hebei region

..... LI Xueming , LAN Jingwei , TIAN Shenzhen , SUN He , LIU He(72)

The study on paleo-environmental significance of grain size sensitive components of loess during Late Pleistocene in southern Liaoning ZHANG Wei , YANG Chanyu(83)

Spatial-temporal evolution of population change and economy development in Liaoning province in recent 20 years WANG Liang , DENG Zhao , YU Wen(93)

Spatial pattern analysis of sports facilities in Tianjin based on POI data

..... HOU Yingzi , GAO Yiran , WANG Fangxiong , BI Hongxing(100)

Research on the production process and optimization of tourism landscape cultural creativity

..... XIE Chunshan , ZHANG Jinyang(107)

Spatial pattern of urban economic development based on nightlight data:A case study of Dalian

..... KE Lina , WANG Shuteng , YIN Shusheng , WANG Hui , TAO Tuoshu(114)

An empirical study on the effects of special functional training promoting the development of

fundamental movement skills of preschoolers (3~6) GU Ying , LI Yingrui(123)

Effects of eleven kinds of sports on working memory of school-age children in China: a network

Meta-analysis ZHANG Ziyun , JIN Chengji , XIE Chao(135)