

1000-6931
44/TL

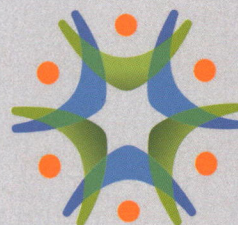
原子能科学技术

ATOMIC ENERGY SCIENCE AND TECHNOLOGY

增刊

2022

第56卷



中核英才

ZHONGHEYINGCAI

中国原子能科学研究院 | 主办
中国核工业集团有限公司 | 主管

ISSN 1000-6931



9 771000 693226

万方数据

目 次

反应堆工程

- 基于环形燃料的低温供热堆热工水力特性数值模拟研究 何晓军,杨世豪,胡立强,邹远方,杨立新(1)
- 高温气冷堆不规则颗粒气动曳力研究 孙琦,王晓钟,王竞弘,彭威(10)
- 矩形窄缝通道内再淹没过程骤冷温度研究 白清城,谢添舟,张妍,陈鑫,李莹,肖章,张婷(19)
- 气液并流向下通过筛板孔口的液膜厚度模型 谯敏,贺艳秋,潘大伟,黄卫星(25)
- 基于耦合框架的多通道程序网格与接口模块开发 潘俊杰,曾未,强胜龙,汤琪芬,李治刚(32)
- 非均匀及非对称加热并联双通道流动不稳定性模拟研究 张巍,张天清,施慧烈,王聪,李净松(42)
- 基于滑移通量模型的毛细管内气溶胶输运与滞留数值研究
..... 王辉,孙晓晖,邢继,孙中宁,谷海峰,王一博(50)
- 基于气动悬浮的高温氧化物熔体热物性测量 张丽,龚耀鹏,元一单,郭强,马卫民(58)
- 事故工况下核电厂安全壳内放射性气溶胶电荷分布研究
..... 孙晓晖,孙婧,王辉,陈巧艳,李精精,龚培礼(67)
- EBR-II 无保护失流试验 SHRT-45R 分析 王晋,王晓坤,杨军,余洋,刘一哲,杨晓燕(74)
- 华龙一号反应堆冷却剂系统抗震设计关键技术 熊夫睿,沈平川,王新军,叶献辉,张毅雄(83)

核燃料与材料

- 辐照后 HTR-10 球形燃料元件电化学解体及裂变产物分布研究
..... 王桃葳,贺林峰,李彩霞,刘小雪,李自强,邵友林,赵宏生,陈晓彤,刘兵,唐亚平(92)
- 多物理场耦合 TRISO 颗粒堆内行为研究 刘仕超,周毅,李垣明,唐昌兵,路怀玉,廖楠(100)
- 钨掺杂陶瓷微囊 UO_2 芯块的制备与性能研究 李明阳,田世艳,杨烨,牡丹(109)
- NH_4HF_2 氟化制备 UF_4 工艺及热力学研究
..... 王林,王继财,唐菲菲,冯建新,崔韩龙,李小强,王文辉,龚伟,朱盈喜(118)
- 等温退火对锆合金表面非晶 $AlNbTiZr$ 中合金涂层结构与力学性能的影响
..... 辛虹阳,毛建军,张伟,滕常青,杨吉军,张伟,阳建,伍晓勇,吴璐(130)
- 高温热处理对 $AlZrNbMo$ 核用高熵合金微观组织及力学性能的影响
..... 滕常青,潘虎成,商洪宇,徐锡语,张伟,伍晓勇,谢东升,吴璐(138)
- 纳米压入难熔金属导致位错环形成的分子动力学模拟研究 汪淑敏,贺新福,杨鹏,豆艳坤(145)
- 纯 $Mo\langle 110 \rangle$ 对称倾侧晶界的分子静力学模拟研究 毛文略,贾丽霞,杨鹏,贺新福(154)

双圆盘柔性转子内阻尼对动力学稳定性的影响 姜 磊,王黎明(163)

装置与设备

三代核电 1 000 MW 级汽轮机摩擦振动故障研究 李 振,陈慧慧,王洪凯,杨全超,董 波,何明圆(171)

核主泵机械密封故障溯源方法与验证
..... 文 学,杨全超,尹 源,杜鹏程,向先保,黄伟峰,胡峰铭,刘 莹,刘向锋(179)

薄壁大跨度箱体结构分层吊装防变形设计 申梦岭,常海军,章文汉,李庆民,温财长(189)

电磁轴承保护轴承在线衰退评估研究 邓 航,时振刚,莫 逆,孙 喆,赵晶晶,刘兴男(200)

铀矿地质

广西苗儿山铀矿田向阳坪矿床成矿时代研究 谭 双,陈 琪,万建军,高 翔,徐 浩,欧阳平宁(211)

某复杂稀土矿湿式电磁选与超导磁选预富集试验研究 张 新,李春风,刘志超,李丽匣,周明亮,马 瑛(225)

核技术及应用

基于 SOM 神经网络和均值漂移算法的 DOI-PET 探测器泛场图像晶体识别
..... 徐一帆,侯岩松,纪英财,孙立风,魏清阳(235)

基于单孔包层与薄膜组成 FP 干涉仪腔的新型光纤应力传感器研究
..... 许 昌,张兴虎,涂 玮,陈柏众,邹 跃,丁小康,牟学峰,闫亭伟(243)

用于 C₆D₆ 测量系统的高精度权重函数计算方法研究
..... 王金成,任 杰,阮锡超,鲍 杰,栾广源,孙 琪,丁琰琰,刘 超(249)

基于核共振吸收法开展爆炸物检测的原理验证研究
..... 刘伏龙,王浩然,薄 楠,党永乐,付光永,吴 笛,何洪钰,贺创业,郭 冰,王乃彦(258)

强流氚氟中子源用 TiD₂ 靶膜制备技术研究 梁斌斌,巴伟伟,王子默,彭怡刚,高 翔,刘 超(265)

低中放固体废物处置场下伏地层包气带中⁶³Ni的测量
..... 马莉娜,宋丽娟,陈 超,马 彦,王路生,张 辉,戴雄新(272)

keV/MeV 能量可切换加速结构设计与调配 杨 誉,杨京鹤,韩广文,王常强,秦 成,崔爱军,朱志斌(279)

期刊基本参数: CN 11-2044/TL * 1959 * m * A4 * 286 * zh * P * ¥40.00 * 1200 * 33 * 2022-06

本期责任编辑 王调霞 王宝金 侯翠梅 汤晓浩 张秀平 韩翠娥 骆淑莉

CONTENTS

REACTOR ENGINEERING

Numerical Simulation of Thermal Hydraulic Characteristics of Low Temperature Heating Reactor Based on Annular Fuel HE Xiaojun, YANG Shihao, HU Liqiang, ZOU Yuanfang, YANG Lixin(1)

Aerodynamic Drag Coefficient of Non-spherical Graphite Dust in HTGRs SUN Qi, WANG Xiaozhong, WANG Jinghong, PENG Wei(10)

Experimental Investigation on Quench Temperature in Narrow Rectangular Channel during Reflooding BAI Qingcheng, XIE Tianzhou, ZHANG Yan, CHEN Xin, LI Ying, XIAO Zhang, ZHANG Ting(19)

Liquid Film Thickness Model of Gas and Liquid Concurrent Downward Flow through Sieve Plate Orifice QIAO Min, HE Yanqiu, PAN Dawei, HUANG Weixing(25)

Development of Mesh and Interface Module for Multi-channel Code Based on Coupling Framework PAN Junjie, ZENG Wei, QIANG Shenglong, TANG Qifen, LI Zhigang(32)

Simulation of Flow Instability in Parallel Two Channels under Non-uniform Heating and Asymmetric Heating Conditions ZHANG Wei, ZHANG Tianqing, SHI Huilie, WANG Cong, LI Jingsong(42)

Numerical Research on Aerosol Transport and Retention in Capillary Tubes Based on Drift-flux Model WANG Hui, SUN Xiaohui, XING Ji, SUN Zhongning, GU Haifeng, WANG Yibo(50)

Thermophysical Property Measurement of High-temperature Oxide Melt by Aerodynamic Levitation ZHANG Li, GONG Yaopeng, YUAN Yidan, GUO Qiang, MA Weimin(58)

Study on Radioactive Aerosol Charge Distribution in Containment of Nuclear Power Plant during Severe Accident SUN Xiaohui, SUN Jing, WANG Hui, CHEN Qiaoyan, LI Jingjing, GONG Peili(67)

Benchmark Analysis of EBR-II Unprotected Loss of Flow Test SHRT-45R WANG Jin, WANG Xiaokun, YANG Jun, YU Yang, LIU Yizhe, YANG Xiaoyan(74)

Key Technology of HPR1000 Reactor Coolant System Seismic Resistance Design XIONG Furui, SHEN Pingchuan, WANG Xinjun, YE Xianhui, ZHANG Yixiong(83)

NUCLEAR FUEL AND MATERIALS

Electrochemical Deconsolidation and Fission Product Distribution of Post-irradiated HTR-10 Spherical Fuel Element WANG Taowei, HE Linfeng, LI Caixia, LIU Xiaoxue, LI Ziqiang, SHAO Youlin, ZHAO Hongsheng, CHEN Xiaotong, LIU Bing, TANG Yaping(92)

Research on In-pile Performance of TRISO Particle under Multi-physics Field Coupling Condition LIU Shichao, ZHOU Yi, LIU Yuanming, TANG Changbing, LU Huaiyu, LIAO Nan(100)

Preparation and Property of Tungsten Added Ceramic Microcell UO₂ Pellet LI Mingyang, TIAN Shiyan, YANG Ye, DU Dan(109)

Study on Preparation of Uranium Tetrafluoride by Fluorination of Ammonium Hydrogen Fluoride and Its Thermodynamics WANG Lin, WANG Jicai, TANG Feifei, FENG Jianxin, CUI Hanlong, LI Xiaoqiang, WANG Wenhui, GONG Wei, ZHU Yingxi(118)

Effect of Isothermal Annealing on Microstructure and Mechanical Property of Amorphous AlNbTiZr Medium Entropy Alloy Coating on Zirconium Alloy Surface XIN Hongyang, MAO Jianjun, ZHANG Wei, TENG Changqing, YANG Jijun, ZHANG Wei, YANG Jian, WU Xiaoyong, WU Lu(130)

Influence of High-temperature Heat Treatment on Microstructure and Mechanical Property of AlZrNbMo Core High-entropy Alloy	TENG Changqing, PAN Hucheng, SHANG Hongyu, XU Xiyu, ZHANG Wei, WU Xiaoyong, XIE Dongsheng, WU Lu(138)
Dislocation Loop Formation in Refractory Metal under Nanoindentation Studied by Molecular Dynamics	WANG Shumin, HE Xinfu, YANG Peng, DOU Yankun(145)
Molecular Statics Simulation of $\langle 110 \rangle$ Symmetric Tilt Grain Boundary in Pure Mo	MAO Wenlue, JIA Lixia, YANG Peng, HE Xinfu(154)
Influence of Double Disk Flexible Rotor Internal Damping on Dynamic Stability	JIANG Lei, WANG Limng(163)

DEVICE AND EQUIPMENT


Research on Rub Induced Vibration Fault of 1 000 MW Steam Turbine in Third Generation Nuclear Power	LI Zhen, CHEN Huihui, WANG Hongkai, YANG Quanchao, DONG Bo, HE Mingyuan(171)
Abnormity Attribution Method and Verification for Mechanical Seal of Reactor Coolant Pump	WEN Xue, YANG Quanchao, YIN Yuan, DU Pengcheng, XIANG Xianbao, HUANG Weifeng, HU Fengming, LIU Ying, LIU Xiangfeng(179)
Anti-deformation Design of Thin-wall Large-span Box Structure during Lifting by Layers	SHEN Mengling, CHANG Haijun, ZHANG Wenhan, LI Qingmin, WEN Caizhang(189)
Study of Online Degradation Assessment for Auxiliary Bearing in Active Magnetic Bearing	DENG Hang, SHI Zhengang, MO Ni, SUN Zhe, ZHAO Jingjing, LIU Xingnan(200)

URANIUM GEOLOGY

Research on Metallogenic Epoch of Xiangyangping Deposit in Miaoershan Uranium Ore Field, Guangxi	TAN Shuang, CHEN Qi, WAN Jianjun, GAO Xiang, XU Hao, OUYANG Pingning(211)
Pre-concentration of Complicated Rare-earth Mineral Bearing Ore by Wet Electromagnetic Separation and Superconducting Magnetic Separation	ZHANG Xin, LI Chunfeng, LIU Zhichao, LI Lixia, ZHOU Mingliang, MA Ying(225)

NUCLEAR TECHNIQUES AND APPLICATIONS

Crystal Identification in DOI-PET Detector Using SOM Neural Network and Mean-shift Algorithm	XU Yifan, HOU Yansong, JI Yingcai, SUN Lifeng, WEI Qingyang(235)
Research on Novel Fiber-optic Strain Sensor Based on Single Micro-channel Cladding-film Fabry-Perot Interferometer	XU Chang, ZHANG Xinghu, TU Wei, CHEN Baizhong, ZOU Yue, DING Xiaokang, MOU Xuefeng, YAN Tingwei(243)
Study on High Precision Weighting Function Calculation Method for C_6D_6 Detector System	WANG Jincheng, REN Jie, RUAN Xichao, BAO Jie, LUAN Guangyuan, SUN Qi, DING Yanyan, LIU Chao(249)
Proof-of-principle Study of Explosive Detection Based on Nuclear Resonance Absorption	LIU Fulong, WANG Haoran, BO Nan, DANG Yongle, FU Guangyong, WU Di, HE Hongyu, HE Chuangye, GUO Bing, WANG Naiyan(258)
Preparation of TiD_2 Target Film for High Current Deuterium and Tritium Neutron Source	LIANG Binbin, BA Weiwei, WANG Zimo, PENG Yigang, GAO Xiang, LIU Chao(265)
Determination of ^{63}Ni in Vadose Zone of Underlying Strata in Low and Medium Level Radioactive Solid Waste Disposal Site	MA Lina, SONG Lijuan, CHEN Chao, MA Yan, WANG Lusheng, ZHANG Hui, DAI Xiongxin(272)
Design and Tuning of keV/MeV Energy Switchable Accelerating Structure	YANG Yu, YANG Jinghe, HAN Guangwen, WANG Changqiang, QIN Cheng, CUI Aijun, ZHU Zhibin(279)
Editors WANG Tiaoxia, WANG Baojin, HOU Cuimei, TANG Xiaohao, ZHANG Xiuping, HAN Cuie, LUO Shuli	



原子能科学技术

(月刊 1959年创刊)

2022年6月 第56卷增刊

ATOMIC ENERGY SCIENCE AND TECHNOLOGY

(Monthly Started in 1959)

Vol. 56 Suppl. Jun. 2022

主管：中国核工业集团有限公司

主办：中国原子能科学研究院

出版：《原子能科学技术》编辑部

(北京市275-65信箱，邮编102413)

电话：(010)69358024, 69357285

E-mail: yznkxjs7285@163.com

http: // www.aest.org.cn

主编：薛小刚

印刷：中鑫顺诚（北京）印刷科技有限公司

国内发行：全国各地邮局

邮发刊号：82-161

国外发行：中国国际图书贸易总公司

(北京市399信箱，邮政编码100044)

发行代号：BM 4130

Responsible Institution: China National Nuclear Corporation

Sponsored by China Institute of Atomic Energy

Published by Editorial Board of Atomic Energy Science and Technology

(P. O. Box 275-65, Beijing 102413, China)

Tel:8610-69358024, 69357285

E-mail: yznkxjs7285@163.com

http: // www.aest.org.cn

Editor in Chief: XUE Xiaogang

(2022)京新出刊增准字第(117)号

2022年6月20日出版

定价：50.00 元

万方数据