

# **8th International Conference on Energy Science and Applied Technology (ESAT 2023)**

E3S Web of Conferences Volume 375 (2023)

**Yichang, China**  
**10-12 March 2023**

## **Editors:**

**Zhigang Fang**  
**Dongjuan Tong**

ISBN: 978-1-7138-7238-2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 4.0 International License. License details:  
<http://creativecommons.org/licenses/by/4.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2023)

For additional information, please contact EDP Sciences – Web of Conferences at the address below.

EDP Sciences – Web of Conferences  
17, Avenue du Hoggar  
Parc d'Activité de Courtabœuf  
BP 112  
F-91944 Les Ulis Cedex A  
France

Phone: +33 (0) 1 69 18 75 75  
Fax: +33 (0) 1 69 28 84 91

[contact-edps@webofconferences.org](mailto:contact-edps@webofconferences.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

Research on AGC Control Performance Optimization and Application of 135MW Coal-Fired Unit..... <i>Ding Yuming, Zhang Li, Cheng Weikun, Zhang Fang</i>	1
Preparation of Polymeric Vesicles with Tertiary Amine and Epoxy Functional Groups Via Polymerization-Induced Self-Assembly..... <i>Zhang Fen, Yao Qian, Li Yantao, Niu Yanling, Chen Xiaoqi, Zhou Haijun</i>	5
Study on Thermodynamic System Characteristics of Thermoelectric Units Under Variable Operating Conditions..... <i>Zhong Ziwei, Zhu Lingkai, Zheng Wei, Gong Zhiqiang, Shang Panfeng, Guo Junshan, Liu Jun, Zhang Yanpeng</i>	10
Power Consumption Characteristics of Cement Industry and Parameter Analysis of Self Provided Power Plant..... <i>Zhu Lingkai, Wang Weishuai, Zhang Haijing, Zheng Wei</i>	14
Application Research on Liner Tube Without Variable Diameter of Shale Gas Plunger Gas Lift Wellhead..... <i>Duan Chengzhi, Xu Haonan, Fan Jing, Wen Lujun, Ni Jianhui</i>	18
Cause Analysis and Solutions About Abnormal Heating of Equipment Clamp .....	23
<i>Zheng Jianjun, Xu Zhehao, Gong Weiwei</i>	
The Quantitative Research on Atmospheric Environmental Corrosion of Aluminum Alloy Products .....	27
<i>Zhu Yuqin, Zhao Fangchao, Li Jiameng, Tan Tiantian, Dai Lu</i>	
Micro-Environment Corrosion Strength Based on Quartz Crystal Microbalance .....	33
<i>Dai Lu, Zhu Yuqin, Qin Chaoxuan, Li Jiameng</i>	
Application Research of Computer Big Data Informatization Technology in Oilfield Mining Automation System .....	38
<i>Shen Zhongmei</i>	
Response of Rhizosphere Microenvironment to Coupling of Climate Warming and Soil Pollution.....	43
<i>Lei Na, Zhang Weihua</i>	
Numerical Investigation of Poroelastic Effects During Hydraulic Fracturing Using XFEM Combined with Cohesive Zone Model .....	47
<i>Ren Xiaoyu, Guan Yueyang, Zhang Xiaofei, Liu Xiaobao, Liu Jie, Liu Kang, Luo Jiangwei, Shi Guiyuan</i>	
Research on the Deposition Mechanisms and Production Characteristics of Untabulated Reservoirs in the X Oilfield of the Songliao Basin .....	54
<i>Wu Pan</i>	
Management Methods of Drilling Shut in .....	61
<i>Wu Haiwei</i>	
Fixed Point Continuous Monitoring System of Oilfield Skeleton and Its Application.....	65
<i>Du Kai</i>	
Application Strategy of Drainage Gas Production Technology in Shallow Gas Fields.....	69
<i>Lv Na</i>	

Characteristics of Water Flooded Layer in Minghuazhen Formation .....	73
<i>Li Zhonglin</i>	
Technology and Effect of Small Well Spacing Control Decline in Close Well Network .....	77
<i>Gan Senlin</i>	
A New Method for Dynamic Prediction of Reservoir Pore Pressure in Development Wells .....	81
<i>Gao Ying</i>	
Information Security Protection Technology of Station and Depot Industrial Control System of Oil Production Plant .....	85
<i>Liu Tianze</i>	
Adjustment and Tapping Technology of Water Drive Reservoir in Late High Water Cut Period.....	89
<i>Jia Peiyi</i>	
Influencing Factors and Measures of Water Drive Oilfield Development Effect.....	93
<i>Gao Hang</i>	
Discussion on Technical Countermeasure of Improving Development Effect of Low Permeability Reservoir .....	97
<i>Li Xiang</i>	
Analysis of Reservoir Geological Characteristics and Development Countermeasures.....	101
<i>Zheng Hong</i>	
Adjustment of Infill in Transition Zone to Improve Oilfield Productivity .....	105
<i>Long Xu</i>	
Analysis of Development Status and Adjustment Method of a Block.....	109
<i>Han Hongzhi</i>	
Study on the Cause Classification and Prevention Methods of Casing Damage.....	113
<i>Jia Fangfang</i>	
Study on the Cause of Casing Damage and the Feasibility of Comprehensive Prevention.....	117
<i>Liu Shiping</i>	
Application of Close Cut Volume Fracturing in Tight Oil Horizontal Wells.....	121
<i>Gao Yude</i>	
Discussion on Reservoir Description Method of Well Vibration Combined with Tight Well Pattern Area .....	125
<i>Liu Pan</i>	
Analysis of the Exploitation Potential of Well DA1 .....	129
<i>Wang Lei</i>	
Study on Water Flooding Law in High Water Cut Stage of Complex Fault Block Reservoir .....	133
<i>Chen Jing</i>	
Study on the Method of Remaining Oil Exploration in Thin Differential Reservoir.....	137
<i>Gao Li</i>	
Discussion on the Function of Logging Technology in Geological Steering of Horizontal Well Drilling .....	141
<i>Li Lin</i>	

Study on the Influence of Oilfield Water Injection on Casing Damage..... <i>Ding Xiangnan</i>	145
The Optimization Method of Control Precision of Injection System in Well Metering ..... <i>Zou Haochen</i>	149
Washed Core and Tracer Tests Data Guide the Characterization of Single Sand Body in Low Permeable Reservoir..... <i>Qin Guoying</i>	153
Discussion on the Countermeasure of Improving the Development Effect of Oil Well Dynamic Analysis..... <i>Jiang Meiyi</i>	158
Causes and Treatment of Adhesive Damage in Polymer Flooding Injection Pipeline..... <i>Tian Long</i>	162
A Certain Block of Oil and Gas Accumulation Understanding .....	166
<i>Bao Yanfeng</i>	
Discussion on Reasonable Flow Pressure in Class I Block of a Oilfield..... <i>Lu Mingzheng</i>	170
Residual Oil Start-Up Mechanism of Polymer/Surface Dual Flooding After Polymer Flooding in Medium-High Permeability Reservoir .....	178
<i>Zhang Nan, Zhao Yuwen, Wang Wei, Wang Xiaoyan, Yan Xi, Yuan Guangyu, Lin Zeyu, Liu Yuanxian, Zhang Jing</i>	
Effect of Perforation Shear on Viscosity of Polymer Solution .....	185
<i>Yan Xi, Wang Xiaoyan, Wang Wei, Lin Zeyu, Yuan Guangyu, Zhan Nan, Han Song, Cai Xidong, Wu Xing, Liang Yanbin</i>	
Analysis on Influencing Factors of Gully Control in Loess Plateau..... <i>Lei Na, Zhang Panpan</i>	191
Capacity Analysis and Understanding of Pilot Test Well in Gas Storage A .....	195
<i>Li Weiyi</i>	
Gas Distributor for Ultra-Large Air Blow-Out Bromine Extraction Plant .....	200
<i>Chai Shujing, Zhang Wenyuan, Yu Xiaoyu, Hao Xiaocui, Li Tao, Wang Zejiang, Liu Wei</i>	
The Vapor-Liquid Equilibrium of Bromine-Brine System at Atmospheric Pressure..... <i>Qian Jianting, Yu Zhaoling, Yang Xincheng, Zhang Xiaolong, Xu Paisheng, Liu Jundong, Liu Wei, Chai Shujing, Zhang Wenyuan, Hao Xiaocui, Wang Yuqi, Zhang Qi, Huang Xiping</i>	204
Preparation of High-Temperature Gels for Enhanced Oil Recovery Using Methyl Etherized Melamine-Formaldehyde Resin .....	208
<i>Guo Hongbin, Ge Jijiang, Li Jiayi</i>	
Research on Foaming Agents for Gas Flooding in Medium-Temperature and High-Salinity Clastic Reservoirs..... <i>Li Kexin, Ge Jijiang, Li Longjie, Li Jiasu, Chu Pengju</i>	213
Development of High Strength Polyvinyl Alcohol Gel for Water Shutoff in Carbonate Reservoirs..... <i>Chen Jin, Ge Jijiang, Wang Wenhui, Chen Pengfei, Chen Weixiong</i>	218

Study on the Influencing Factors of Productivity Under Pressure Drive Development in Low Permeability Reservoir .....	223
<i>Cui Chuanzhi, Wang Guobiao, Lu Shuiqingshan</i>	
Hot-In-Place Recycling Engineering Application of Low Penetration Aged Asphalt .....	228
<i>Shi Ning, Xiao Hongyu, Xiao Jiang, Liu Qi</i>	
Study on the Method of Identifying Fractures by Ant Tracking Technique.....	233
<i>Zhang Juan, Liu Ke, Han Xianbo</i>	
Study on the Influence of Different Key Parameters on EOR in LB Block .....	237
<i>Wang Qunyi, Bi Yongbin, Zhang Yang, Cao Tongfeng, Liu Dong</i>	
Fine Dissection of Meandering River Sand Bodies Under Dense Well Nets .....	243
<i>Liu Ye, Lu Hong, Hu Yun</i>	
Application of Multiphase Flow Fiber Optic Fluid Production Profile Testing Technology in W1 Well .....	249
<i>Yu Fuji</i>	
Research Progress on Stability Analysis Methods of Granite Residual Soil Slope .....	254
<i>Wang Zian, Zheng Chao, Zhang Le, Xiong Kangwei, Li Zhanlin</i>	
Preparation of Quaternary Ammonium Gemini Surfactant and Its Application in Insulator Cleaning.....	261
<i>Wan Xinyuan, Xia Xiaojian, Chen Yiyang, Lin Deyuan, Hong Yicheng, Zhang Wenzhe, Hou Linxi</i>	
Development Prospect of Heat Supply and Peak Shaving of Nuclear Power Units in Shandong Power Grid .....	265
<i>Zhu Lingkai, Zheng Wei, Zhong Ziwei, Gong Zhiqiang, Guo Junshan</i>	
Research on Technical Supervision of Steam Turbine in Nuclear Power Plant.....	269
<i>Che Yongqiang, Chen Yisen</i>	
Application of Lidar in Comparison of Wind Speed and Wind Direction Meters in Wind Power Field.....	274
<i>Wang Hua, Wang Jinshan, Tian Wenqiang, Bao Zhiqiang, Wang Bao, Gou Yanxu</i>	
Application of Mobile Vibration Online Comparison Sensor in Wind Power Field.....	278
<i>Wang Hua, Wang Jinshan, Tian Wenqiang, Bao Zhiqiang, Wang Bao, Gou Yanxu</i>	
Study on Amplification Effect of Wind Turbine Blade Stopping Position on Vortex Induced Vibration of Tower.....	282
<i>Wang Ziyue, Jiao Shoulei, Zhang Guowei, Chen Xiaoxu</i>	
Effect of Dam Removal of Small Hydropower Station on Migration and Distribution of Biogenic Elements: Progress and Prospects .....	286
<i>Li Cai, Guan Linjie, Yang Kun, Zhang Li, Fan Qingsong</i>	
A Novel Doping Layer Strategy to Realize High Efficiency Laye-By-Layer Organic Solar Cells .....	290
<i>Li Xinrui, Du Xiaoyang, Tao Silu</i>	
Unit Commitment Considering the Different Frequency Supporting Capability of Synchronous Generators .....	295
<i>Zhang Jiaqi, Xu Guoyi, Li Beibei, Han Lei</i>	

Integrated Photo - Rechargeable Batteries: Photoactive Nanomaterials and Opportunities ..... <i>You Liwen</i>	300
Utilizing CO <sub>2</sub> from Refinery for Methanol and Electricity Coproduction: System Assessment ..... <i>Ma Qian, Yu Xiaodan, Xia Song, Zhang Xu, Liu Anqi, Yuan Bo, Chen Xiaojun</i>	310
Utilizing Carbon Dioxide from Refinery for Methanol and Electricity Co-Production: System Design and Economic Assessment ..... <i>Ma Qian, Wang Yuxi, Zhang Xu, Yu Xiaodan, Liu Anqi, Yuan Bo, Chen Xiaojun</i>	314
Calculation Model of Non-Nuclear Steam Rush in Steam Turbine of Nuclear Power Unit Construction and Application ..... <i>Liu Junseng, Kang Zhen, Wang Miaomiao, Chao Shima, Xi Jingbin, Wu Zhijun, Wang Wei, Zhang Zhenlu</i>	318
An Improved Multi-Objective Gray Target Model for Project Resource Allocation Selection Research ..... <i>Xu Yaqiang</i>	323
Research Progress of Energy Equalization Topology of Power Lithium Battery Pack ..... <i>Miao Yinbao, Zhang Wenhua, Liu Weihao, Kang Dongqi, Wang Shuai, Chen Zhe, Liu Jia, Chen Baoxian, Zhu Leijing</i>	329
Performance Test of a 660MW Thermal Power Unit Steam Turbine Based on the Background of “Double Carbon” ..... <i>Zhong Ziwei, Zhu Lingkai, Zheng Wei, Gong Zhiqiang, Shang Panfeng, Guo Junshan, Liu Jun, Zhang Yanpeng</i>	335
Application Research on Zero Output of Double Low Pressure Cylinder of 600MW Unit ..... <i>Liu Jun, Zhu Lingkai</i>	339
Research on Intelligent Regulation System of Solar Panels Driven by Low-Voltage Electric Energy..... <i>Zhang Wei, Lin Xuefeng</i>	344
Economic Day-Ahead Scheduling of SOFC and Biomass-Based Integrated Tri-Generation Energy System Using Artificial Bee Colony Algorithm ..... <i>Zhao Pengxiang, Zhu Jianjun, Zhang Yanru, Wang Qiang, Yang Xian, Cong Lin</i>	348
Study on the Thermal Decomposition Reaction Process and Kinetics of SF6 and Tungsten ..... <i>Xu Mengyuan, Lv Houhua, Liu Yunfang, Yang Ren, Han Yanhua, Xu Liuyu, Li Xu, Li Juihong, Zhang Xiao, Jian Yajun, Zhang Weiqiang</i>	358
Study on Calculation of Inlet Steam and Inlet Water Flow of Drain Pump of Low Pressure Heater ..... <i>Zhu Lingkai, Zheng Wei, Wang Qian, Zhong Ziwei, Gong Zhiqiang</i>	364
A Novel Transmission Network Planning Framework Under the New Power System ..... <i>Yan Chaochen, Tao Ye, Zhao Yu, Wang Jiaxing, Wang Yuqing, Zhu Jiang</i>	368
Day-Ahead Load Optimal Distribution of Thermal Power Coupled Electric Energy Storage Frequency Regulation System Considering the Effect of Overtemperature ..... <i>Zhou Xichao, Wang Nan, Li Zhen, Zhao Pengxiang, Cong Lin</i>	374
Overview of Landfill Leachate Treatment Technology ..... <i>Qin Ruqiong</i>	381
Highly Active Cu-MFI Catalyst for Conversion of Furfuryl Alcohol to Pentanediols ..... <i>Dai Dengfeng, Liu Dandan, Liu Yunqi</i>	385

A Real-Time Corrosion Monitoring Method Based on Quartz Crystal Microbalance .....	389
<i>Qin Chaoxuan, Dai Lu, Zhu Yuqin</i>	
The Detection Methods of Hydroxyl Radical: A Review .....	393
<i>Huang Chenkun, Chen Qiuyue, Li Shengqiang, Wang Jian</i>	
Research on Time-Varying Economic Dispatch of Smart Grid Based on Lagrangian Pairing .....	397
<i>Zuo Ying</i>	
Application Prospect of High Efficiency and Energy Saving Bromine Extraction Technology in the Field of Bromine-Containing Waste Salt.....	401
<i>Zhang Wenyan, Chai Shujing, Hao Xiaocui, Liu Wei, Wang Yuqi, Zhang Qi</i>	
Research on Energy-Fed Suspension Control System of New Energy Vehicles Based on Energy Flow Analysis.....	405
<i>Ding Jiageng</i>	
Evaluation Model and Promotion Based on the Ecological Characteristics of Sainhanba .....	409
<i>Wang Bingqi</i>	
The Relation Between the CO <sub>2</sub> Concentration Levels and the Temperature .....	416
<i>Lin Yuyuan, Zeng Zidong, Chen Lang, Deng Zifeng</i>	
A Light Pollution Risk Model Based on Improved Assessment and Prediction Methods .....	421
<i>He Ziyan, Guo Ruikun, Yang Haiwei</i>	
Energy Efficiency Optimization of Ships Based on Particle Swarm Optimization .....	425
<i>Zhang Ailin, Liang Zhengxu</i>	
Diagnosis and Analysis of Thermal Power Plant Operation in Heating Season.....	430
<i>Zhang Yanpeng, Zhu Lingkai, Li Si, Shang Panfeng</i>	
Study on the Relationship Between Tea Concentration and Tyndall Effect .....	434
<i>Yang Yifan, Su Xiaofeng, Xu Yongke, Jin Weigang, Shen Bangxing, Zhang Xinfeng, Lv Ruibo, He Yi, Guo Chunfeng, Li Yuefeng, Zou Jun</i>	
Basic Characteristic Analysis of Self-Provided Power Plant in Iron and Steel Industry .....	441
<i>Zhu Lingkai, Zhang Haijing, Wang Weishuai, Wang Qian, Zheng Wei, Zhong Ziwei</i>	
On the Importance of Self Owned Power Plants Participating in the Adjustment of Supply and Demand of Power Network Under the Reform of Power System .....	445
<i>Zhu Lingkai, Zhang Haijing, Wang Weishuai, Wang Qian, Zheng Wei, Zhong Ziwei</i>	
Test and Research on Load Capacity of a 210MW Unit in Heating State .....	449
<i>Zhong Ziwei, Zhu Lingkai, Zheng Wei, Gong Zhiqiang, Shang Panfeng, Guo Junshan, Liu Jun, Zhang Yanpeng</i>	
A 1000MW Ultra-Supercritical Secondary Reheat Unit Energy Consumption Analysis of Thermodynamic System .....	453
<i>Zhang Hu, Lao Jinxu, Cheng Huitao, Liang Kai</i>	
Analysis of Heating Transformation of Different Types of Thermal Power Units .....	458
<i>Lao Jinxu, Zhang Hu, Zheng Wei, Shang Panfeng, Han Yue</i>	
Prospect of Peak Regulation Capacity Improvement Through Flexibility Transformation of Combined Heat and Power Units in Shandong Province .....	463
<i>Gong Zhiqiang, Han Yue, Guo Junshan, Shang Panfeng, Zhu Lingkai</i>	

Research on Operation of Low-Pressure Cylinder Zero Output Heat Supply Retrofit Unit.....	468
<i>Lao Jinxu, Zhang Hu, Han Yue, Shang Panfeng</i>	
Medium- And Long-Term Power Load Forecasting Model .....	472
<i>Zhu Yuning, Xu Xiaoliang, Lai Ruoqi, Guo Hengqing, Jia Fan</i>	
Study on the Electrothermal Coupling Characteristics of Different Types of Thermoelectric Units.....	477
<i>Zhong Ziwei, Zhu Lingkai, Zheng Wei, Gong Zhiqiang, Shang Panfeng, Guo Junshan, Liu Jun, Zhang Yanpeng</i>	
Introduction on Current Application of Voltage Transformer.....	481
<i>Yang Jun, Fan Ziming, Yang Yue, Zhao Xiayao</i>	

**Author Index**