

**Taishan Academic Forum 2014**

**Project on Mine Disaster  
Prevention and Control**

**Advances in Engineering Research Volume 4**

**Qingdao, China  
17-20 October 2014**

**ISBN: 978-1-63439-491-8**

**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.**

Copyright© (2014) by Atlantis Press  
All rights reserved.  
<http://www.atlantis-press.com/php/pub.php?publication=mining-14>

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact Atlantis Press  
at the address below.

Atlantis Press  
29 avenue Laumière  
75019 Paris  
France

[contact@atlantispress.com](mailto:contact@atlantispress.com)

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

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## MINE CONSTRUCTION AND MODERNIZATION

<b>Selection of A Rational Form for The Steel Winding Tower as A Preventive Measure to Increase Its Industrial Safety .....</b>	1
<i>Elena.G. Kassikhina, Vladimir V. Pershin, Nikiya O. Butrim, Weiguo Qiao</i>	
<b>Engineering and Process Design Solutions for the Vertical Shaft Completion.....</b>	5
<i>Weiguo Qiao, V.V. Pershin, E.G. Kassikhina, N.O. Butrim</i>	
<b>Study on Construction of Embedded Bolt Sleeve's Precision in Massive Concrete .....</b>	11
<i>Chongge Wang, Jiachuan Liu</i>	
<b>Economic and Technological Criteria of Choosing the Support for Construction of Mine Workings.....</b>	15
<i>Weijie Song, V.V. Pershin, Yu.A. Masaev, V.Yu. Masaev, Weiguo Qiao</i>	
<b>Constructions Parameters Updating of Protecting Apron Under Deepening of Vertical Shafts .....</b>	21
<i>Vladimir V. Pershin, Aleksandr I. Kopyitov, Mikhail D. Voiyov, Akhmed A. Wetti, Ivan V. Zhuk</i>	

## MINING THEORY, METHOD AND TECHNOLOGY

<b>Highwall Mining Stability .....</b>	25
<i>Baotang Shen</i>	
<b>Study on the Movement Law of Overburden Strata During Mining Strip Pillar with Paste .....</b>	38
<i>Weijia Guo, Yangyang Li, Baoliang Zhang, Hailong Wang, Xizhen Sun</i>	
<b>Numerical Simulation Study on Influencing Factors to Part-filling Pillars' Stability .....</b>	44
<i>Wanpeng Huang, Yanghui Ren, Lin Gao</i>	
<b>Research on Strip Filling Surface Subsidence Rule .....</b>	52
<i>Yongkui Shi, Minhua Qi, Jingyu Zhang, Jian Hao</i>	
<b>Characteristic Analysis of Surface Subsidence in Deep Mining .....</b>	62
<i>Xikun Chang, Rongfa Wang, Jinchen Zhang</i>	
<b>Mechanical Models and Support Technologies for Retaining Gob-side Entry.....</b>	67
<i>Yunliang Tan, Yanchun Yin, Jianguo Ning, Tongbin Zhao</i>	
<b>Influence of Mining and Retaining Parameters on Evolution of Hazard Rockburst in Strip-pillar Mining .....</b>	73
<i>Chunqiu Wang, Wenshuai Li, Shitan Gu, Chuanle Ma, Zhimin Xiao</i>	
<b>The Application of Fuzzy Analytic Hierarchy Process for Thick Coal Seam Mining Methods in China .....</b>	84
<i>Lei Wang, Yang Yang, Huimin Cheng</i>	
<b>Simulation Study of Dynamic Response of Bolt Support in Impact Roadway .....</b>	93
<i>Fan Liu, Wenjie Liu, Tongxu Wang</i>	
<b>Rapid Heading Technology of Coal Seam Containing Iron Sulfide Nodules.....</b>	99
<i>Xinglin Wen, Mengmeng Dong, Ran Fan, Kai Sun, Zhongjian Zhang</i>	
<b>Simulation and Analysis on Characteristics of Lower-group Roadway Surrounding Rock under Deep Near Interval Coal Seam .....</b>	107
<i>Peisen Zhang, Hao Wang, Dongcai Lin, Zhonghui Kan</i>	
<b>Study on Grouting Anchor Cable Supporting Technology of Roadway through Extra Large Fault Fracture Zone .....</b>	114
<i>Jinxiao Liu, Jidong Jing, Yiyu Feng, Lei Wu, Peisen Zhang</i>	
<b>Study on Optimal Design of Concrete-Filled Steel Tube Support in Coal Mine .....</b>	119
<i>Limin Liu, Shijun Zhao, Junzhi Cao, Zhongcheng Qin</i>	
<b>Measurement and Analysis on Failure Height of Overburden Strata of mechanized sublevel caving in Shallow Region of Baodian Coal Mine.....</b>	126
<i>Fuchen Li, Wenguan Zhang, Wei Guo, Zongsheng Wang, Yunjiang Li, Yanxin Liu</i>	
<b>Study on the Rapid Excavation Technology of Deep Large Cross-section Rock Tunnel.....</b>	133
<i>Xinjie Liu, Dezhong Kong, Gaofeng Song</i>	
<b>Large Deformation Control Principle and Reinforcement Technique for Solid Coal Rib of Large-Section Gob-side Tailentry in Thick Coal Seam buried Deeply .....</b>	138
<i>Chuanwei Zang, Miao Chen, Yunliang Tan, Chuanle Ma, Xiangjun Meng</i>	
<b>Durability Test of Gangue Paste Filling Material .....</b>	144
<i>Yin Liu, Qifeng Wang, Haoqiang Zhang</i>	

<b>Coal Deposits' Mining with High Content of Natural Radionuclide .....</b>	150
<i>Pavel B Avdeev, Galina P. Sidorova</i>	
<b>Advanced Technology Based on New Technological and Organizational Principles of Spatial Development of Front of Mining Operations at Open Pits.....</b>	156
<i>Alexei V. Selukov</i>	
<b>Fractal Characteristics of Mudstone Microscopic Morphology in MATLAB Environment .....</b>	161
<i>Dongmei Huang, Zhenquan Zhang, Xiaofei Lin, Huaxue Li</i>	

## **MINING EQUIPMENT AND MACHINERY**

<b>Modeling of Hydraulic Power Cylinder Seal Assembly Operation .....</b>	167
<i>Gennady D Buyalich, Konstantin G Buyalich</i>	
<b>Formation Auger Equipment Reliability .....</b>	171
<i>Yuri V. Dorzdenko</i>	
<b>Stress-Deformed State Knots Fastening of a Disk Tool on the Crowns of Roadheaders.....</b>	177
<i>Aleksey Khereshok, Leonid Mametyev, Andrey Bosirov, Aleksey Vorobiev</i>	
<b>Preventive Maintenance of Mining Equipment Based on Identification of Its Actual Technical State.....</b>	184
<i>Kovalev Vladimir, Gerike Boris, Khoreshok Aleksey, Gerike Pavel</i>	
<b>Evaluation of Explosion Protection Means of Mine Electrical Equipment for Operation in Excavations of Coal Mines .....</b>	190
<i>Vladimir Efremenko, Roman Belyaevsky</i>	

## **CONSTRUCTION SAFETY IN MINES AND UNDERGROUND ENGINEERING**

<b>Study of Asymmetric Failure Law and Support for Large Embedded Depth Roadway Driving along the Roof in Inclined Coal Seam .....</b>	195
<i>Guoqiang Cheng, Mingju Yan, Hongli Zhu, Haifeng Yu</i>	
<b>Analysis on Human Safety Behavior Mode during the Production Process .....</b>	203
<i>Gang Zhou, Jiao Xue, Hao Wang, Qi Zhang</i>	
<b>Control Design of Roof Rock for Advance Blasting in Roof on Gob-side Entry Without Roadside Support .....</b>	211
<i>Kaizhi Zhang, Baocheng Liu</i>	
<b>Drilling Strata Movement Detection Experiment on Failure Law of Overlying Strata Movement.....</b>	218
<i>Shijian Yu, Zhaobin Liu</i>	
<b>Research of Mining Depth Influence on Floor Coupled Stree-seepage Characteristics .....</b>	224
<i>Liming Yin, Nan Shi, Juntao Chen</i>	
<b>Rock Burst Danger Warning and Large Diameter Drilling Pressure-relief Technology in Fully Mechanized Caving Island Coal Face .....</b>	231
<i>Shitan Gu, Zhimin Xiao, Ruijing Huang, Yunliang Tan, Bangyu Jiang, Wenshuai Li</i>	
<b>Numerical Simulation of Stress Relieving and Analysis of Influencing Factors on Geostress Measurement.....</b>	241
<i>Tongbin Zhao, Minglu Zhang, Zhanhai Li, Ze Zhang</i>	
<b>Numerical Simulation of Roadway Gas Migration Based on the Lattice Bolzmann Method .....</b>	248
<i>Zhigang Zhao, Yongbo Zhang, Yunliang Tan</i>	
<b>Research Status of Wet Duster in Fully Mechanized Workface .....</b>	258
<i>Yang Zhong, Mengmeng Wu, Xinxiang Yang, Wei Xiao</i>	
<b>Development and Application of Integrative Jumbo for Deep Hole Sampling.....</b>	273
<i>Gang Wang, Xinxiang Yang, Wei Xiao, Mengmeng Wu</i>	
<b>Analysis on the Old Gob Water Inrush Accident of Kunlun Mine in Zibo .....</b>	282
<i>Hua Jiang, Wenren Gai, Fu Zhao, Xin Zhang, Hailin Liu</i>	
<b>Risk Assessment of Floor Water Inrush in Deep Mine Based on Grey System Theory.....</b>	288
<i>Weitao Liu, Xiaofeng Pan, Huan Liu, Jianjun Shen</i>	
<b>The Water-disaster Characteristic of Coal Mine in Shandong Province and the Research on Prevention and Control Countermeasures .....</b>	294
<i>Wenquan Zhang, Zhongping Ren, Hua Jiang, Gaoliang Sun, Qianqian Hang, Yi Dong</i>	
<b>Determination of Rational Coal and Rock Pillars Height of Coal Mining Under the Loose Aquifer .....</b>	306
<i>Jianhu Wang, Mingxi Shao, Yanfeng Shang, Siwen Cao, Xin Zhang, Chuanneng Hu</i>	
<b>Research on Water Resistance of The Hanging Wall of the Fault Tilting Water-resisting Key Strata Model .....</b>	312
<i>Yuhe Wang, Xinglei Zhang, Houchen Wang, Jiulong Cheng, Wei Guo</i>	

<b>Study on Test Method of Rock Acoustic Emission and Damage Evolution Characteristics Under Triaxial Compression .....</b>	321
Yongjie Yang, Depeng Ma, Yanxin He, Luyi Xing	
<b>Research Advances of Heterogeneity Representation Methods for Rocks .....</b>	327
Yanchun Yin, Yunliang Tan, Weijia Guo, Minglu Zhang	
<b>The Numerical Simulation of The Influence from Fault Dip Angle on Coalface Pressure.....</b>	333
Li Zhang, Junfeng Xia, Chuanwei Zang	
<b>The Research and Application of The Hard Roofs Forced Caving Technology in Short Wall Stopes .....</b>	339
Min Gao, Jiuchuan Wei, Xiaoqi Ma	
<b>To the Question of the Destroyed Rock Mass Movements Regime Assessment.....</b>	345
Victor S. Kharkoaskyi, Valery M. Plotnikov, Eugenia V. Komleva, Olessya A. Kogay, Anna S. Korobkian, Anna V. Harlamova, Yuri N. Goncharov, Bekturkh Balikbayev	
<b>Simulation of Stress-Strain State of The Reinforced Soil Foundation for Structures.....</b>	350
Sergei M. Prostov, Mikhail V. Solokov	
<b>Inert Compositions For Underground Fire Fighting in Mines .....</b>	356
Vyacheslav Portola, Nima Galsanov	
<b>Modeling Peculiarities of Reinforced Crack of Hydraulic Fracture of Coal Seams for Estimation of Their Permeability .....</b>	361
Mihail Alekseevich Baev	

## **MINES, UNDERGROUND ENGINEERING OPERATION AND MANAGEMENT**

<b>Application of Safety Check List On Confidential Inspection .....</b>	367
Haiyan Chen, Jianguang Gao, Yunfei Xu	
<b>Coal Mine Safety Influence Factors Causality Analysis and Function Relationship Construction Based on System Dynamics .....</b>	375
Jing Chen, Yongjie Yang, Qinggui Cao	
<b>Research and Application of Heat Exchange System in Sun Village Coal Mine .....</b>	381
Xinghua Li, Bin Xiao, Limei Zhang	
<b>Research of Safety Pre-control Management System of Power Plants.....</b>	387
Xinghua Li, Suli Wang	
<b>Study on Early Warning Method of Coal Mine Accident about Ventilation, Gas, Dust and Fire .....</b>	392
Xiaofei Lin, Shouxin Song, Dongmei Huang	
<b>The Influence of Coal Mining on Groundwater Resources and the Analysis of Water Resources Protection Countermeasure .....</b>	398
Hongri Zhang, Yuanyuan Sheng, Guibin Zhang, Zhizhuo Dong, Yu Liu	
<b>The Transport Systems of Simulation and Optimization of Dingfeng's Slime and Gangue Power Plant.....</b>	406
Xinghua Li, Danying Wang	
<b>Rare Earth Elements in Kuznetsk Coals: Ability to Excavate and New Functional Materials.....</b>	418
Tatyana G Cherkasova, Elizaveta V Cherkasova, Elza S Tatarinova, Alena A Bobrovnikova, Irina P. Goryunova, Yuliya A. Mihaylenko, Anastasia V Tihomirova, Irina V. Isakova	
<b>The Main Characteristics of Freight on Hot Streams.....</b>	421
Natalya V. Eroseeva, Irina N. Chebotova	
<b>Study of the Process of the Polymer Flocculants Degradation Used for Coal Processing .....</b>	424
Sergey D. Eymenov, Galina L. Eymenova	
<b>Safety of Mining Engineering Buildings and Facilities Under Fem Analysis and Catastrophe Theory .....</b>	428
Vladimir Viktorovich Pershin, Dmitriy Ivanovich Nazarov	
<b>Physical Basis of the Controlled Electrochemical Treatment of Soils from Oil Products .....</b>	433
Institute T.F. Prostov, Maxim B. Gucal, Evgeniy F. Shabanov	
<b>Justification Complex Purification Technology Open-pit Mines Wastewater .....</b>	441
M.A. Tyulenev, Y.V. Lesin	
<b>Solid Fuel Obtaining by Processing of Coal Enterprises Technogenic Materials .....</b>	445
Andrey D. Ushakov, Elena S. Ushakova, Gennaday V. Ushakov	
<b>Experience for Coal Mine Methane Utilization to Generate Thermal and Electric Power .....</b>	450
Oleg V. Tailakov, Denis. N. Zastrelov, Evgeniy A. Utkaev, Alexey I. Smyslov, Alexey N. Kormin	
<b>Study on the Dissipation Mechanism of Shock and Vibration Energy in a Stress Release Area of Deep Roadway .....</b>	454
Jianguo Ning, Jun Wang, Xuesheng Liu, Yunliang Tan	
<b>Author Index</b>	