

2007

中国(淮南)煤矿瓦斯治理技术国际会议论文集

Proceeding of 2007'China (Huainan) International Symposium
on Coal Gas Control Technology

2007年10月25-26日, 中国·安徽·淮南
October 25-26, 2007, Huainan · Anhui · China

主办单位:

煤矿瓦斯治理国家工程研究中心

中国煤炭学会

淮南矿业集团

中国矿业大学

澳大利亚联邦科学与工业研究院

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煤矿瓦斯治理国家工程研究中心

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National Engineering and Research Center
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China Coal Society

Huainan Mining (Group) Co. Ltd., China

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Co-sponsored by :

NERC of Coal Gas Control, China

中国矿业大学出版社

China University of Mining and Technology Press

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主编 袁 亮

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EDITER Yuan Liang

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内 容 提 要

本论文集是国内外广大工程技术人员、专家在总结煤矿瓦斯治理和利用技术的基础上,结合工作实践、勇于创新、攻克难关的新理论、新技术和新方法的总结。全书共分为7个部分:①煤矿瓦斯综合防治技术;②煤矿瓦斯抽采及利用技术;③煤矿煤与瓦斯突出防治技术;④煤矿瓦斯爆炸防治技术;⑤煤矿瓦斯安全监测监控技术;⑥煤矿通风防灭火技术;⑦其他。

本论文集具有较高的技术水平和应用价值,可供煤炭行业广大工程技术人员和高等院校师生参阅。

图书在版编目(CIP)数据

2007 中国(淮南)煤矿瓦斯治理技术国际会议论文集/

袁亮主编. —徐州:中国矿业大学出版社,2007.9

ISBN 978 - 7 - 81107 - 754 - 4

I. 2… II. 袁… III. 煤矿—瓦斯爆炸—防治—国际会议—文集 IV. TD712

中国版本图书馆 CIP 数据核字(2007)第 152645 号

书 名 2007 中国(淮南)煤矿瓦斯治理技术国际会议论文集

主 编 袁 亮

责任编辑 杨 廷 马跃龙 吴冬梅

责任校对 周俊平

出版发行 中国矿业大学出版社

(江苏省徐州市中国矿业大学内 邮编 221008)

网 址 <http://www.cumtp.com> E-mail cumtpvip@cumtp.com

排 版 中国矿业大学出版社排版中心

印 刷 徐州新华印刷厂

经 销 新华书店

开 本 787×1092 1/16 印张 38 字数 942 千字

版次印次 2007 年 9 月第 1 版 2007 年 9 月第 1 次印刷

定 价 150.00 元

(图书出现印装质量问题,本社负责调换)



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前 言

中国是煤炭生产大国,2006 年原煤产量达 23.5 亿 t,且以井工开采为主,其产量占煤炭总产量的 95%。随着煤矿开采深度的增加,煤层瓦斯压力大、瓦斯含量高,煤质松软,煤层透气性低,煤层瓦斯不易在采前抽采,但在采掘过程中,瓦斯放散量大、放散速度快,再加上开采煤层地质条件复杂,煤与瓦斯突出灾害日趋严重。中国国有煤矿全部是瓦斯矿井,且高瓦斯和煤与瓦斯突出矿井占 50%以上,300 多对矿井为煤与瓦斯突出矿井,中国已经成为世界上煤与瓦斯突出灾害最严重的国家。瓦斯涌出或煤与瓦斯突出控制不当将可能导致瓦斯爆炸事故的发生,从而造成更大的灾难。为了从根本上遏制煤矿瓦斯灾害事故,充分利用瓦斯这一高效清洁能源,减少温室气体排放,中国政府先后出台了一系列促进煤矿瓦斯抽采和利用的政策,加大了对煤矿瓦斯抽采技术改造的投入和瓦斯利用的政策扶持力度,有力地促进了中国煤矿瓦斯的先抽后采,保障了中国煤炭工业的安全可持续发展。2006 年中国煤矿瓦斯抽采量达 32 亿 m^3 ,瓦斯利用量达 12 亿 m^3 ,瓦斯发电装机容量达 12 万 kW,建设中的瓦斯发电装机容量达 34 万 kW。2006 年,中国煤矿安全生产达到了近 30 年来的最好水平。

淮南矿业集团地处华东经济发达区腹地,安徽省中北部,地理位置优越,交通运输便捷。矿区东西长约 100 km,南北倾斜宽约 30 km,面积约 3 000 km^2 ,煤炭储量 501 亿 t,瓦斯储量 5 928 亿 m^3 。淮南矿区是我国高瓦斯、低透气性煤层群、煤岩松软、地质条件特别复杂的典型矿区。1998 年以前,由于瓦斯抽采效果极差,年瓦斯抽采量仅为 520 万 m^3 ,造成瓦斯事故频繁发生,生产效率低下。为了从根本上扭转瓦斯灾害严重制约安全生产的不利局面,从 1998 年开始,淮南矿业集团与中国矿业大学和煤炭科学研究总院等著名科研单位合作对淮南瓦斯治理技术进行联合攻关,建立了系统完整的淮南矿区瓦斯治理技术体系,瓦斯抽采量逐年增加,2006 年矿区瓦斯抽采量达到 1.73 亿 m^3 ,控制了重特大瓦斯爆炸事故的发生,2006 年原煤产量达到 3 383 万 t,百万吨死亡率下降到 0.18 人。目前,淮南矿业集团共有民用瓦斯用户 38 000 户,总储气能力 20 万 m^3 ,瓦斯发电装机容量达 3.2 万 kW。在长期瓦斯灾害治理的实践过程中,淮南矿业集团总结的“可保尽保,应抽尽抽,先抽后采”和“高投入、重利用,以用促抽”等瓦斯治理理念成为《煤矿瓦斯治理经验五十条》的重要条款。近年来,淮南矿业集团积极促进国际交流与合作,先后与德国、澳大利亚和日本等国的研

究单位和企业合作,开展了煤矿瓦斯治理和利用等方面的研究和开发工作。

2005年10月,经国家发展和改革委员会批准,由淮南矿业集团和中国矿业大学共同组建煤矿瓦斯治理国家工程研究中心,中国矿业大学为研发基地,淮南矿业集团为产业化基地。煤矿瓦斯治理国家工程研究中心以瓦斯地质保障技术、煤与瓦斯共采技术、矿井安全监测监控技术、瓦斯灾害预警技术、煤矿瓦斯利用技术等具有技术优势和产品优势的技术研究为基础,跟踪国内外技术发展动态,为煤矿瓦斯灾害防治提供成套的先进工艺、技术及装备,从而为提高中国煤矿瓦斯治理和利用技术水平作出应有的贡献。

在总结中国煤矿、特别是淮南矿区瓦斯治理和利用技术的基础上,为了进一步促进煤矿瓦斯治理和利用方面的国际交流与合作,由煤矿瓦斯治理国家工程研究中心、中国煤炭学会、淮南矿业集团、中国矿业大学、澳大利亚联邦科学与工业研究院(CSIRO)、德国煤炭研究院(DMT)、日本煤炭能源中心(JCOAL)共同发起,煤矿瓦斯治理国家工程研究中心承办的“2007中国(淮南)煤矿瓦斯治理技术国际会议”,将于2007年10月25日~28日在中国安徽省淮南市举行。本次国际会议得到了国内外同行的积极响应,会议共收到来自中国、德国、澳大利亚和日本等国的学术论文72篇。论文集包括煤矿瓦斯综合防治技术、煤矿瓦斯抽采及利用技术、煤矿煤与瓦斯突出防治技术、煤矿瓦斯爆炸防治技术、煤矿瓦斯安全监测监控技术和煤矿通风防灭火技术等几方面内容,反映了当今国际煤矿瓦斯治理与利用方面的最新研究成果。

金秋十月,各国学者齐聚淮南,共同研讨煤矿瓦斯治理和利用的理论与技术,交流煤矿瓦斯治理和利用的技术经验,必将对煤矿瓦斯治理和利用起到积极的促进作用。衷心祝愿本次大会取得圆满成功,祝各位学者身体健康、工作顺利。

2007 中国(淮南)煤矿瓦斯治理技术国际会议组委会

2007年9月

Foreword

China is a large coal producer in the world. The coal sector produced 2 350 million tons of raw coal in 2006, and 95 percent were produced by underground mining. The gas pressure and content become higher, and the coal seam become soft and its permeability for gas lower as the carving depth increases, thus it is difficult to drain gas before mining. The gas release volume is high and speed is fast during mining. Because of this, as well as the complexity of geological conditions, the coal and gas outburst disasters become worse. All of the state-owned mines are gassy mines, and the percentage of high gassy mine and coal and gas outburst mine are more than 50 percent. There are more than 300 pairs of coal and gas outburst mines, and China has been the country which is most vulnerable to coal and gas outburst. The improper control on gas emission or coal and gas outburst may lead to gas explosion accidents, and then adds to the devastation. A series of policies on gas drainage and utilization had been issued aimed at repressing the gas accidents of coal mine rapidly, making most use of the high efficient and clean energy, and reducing the greenhouse gases emission, which increases the policy support on the investment of technical innovation of gas drainage, promotes the operation of draining gas before mining in mines, and guarantees the safety and sustainable development of coal industry of China. In 2006, the gas drainage volume from coal mines was 3 200 million m^3 and the use volume of gas was 1 200 million m^3 , the gas power installation capacity was 120 000 kW, and the capacity of gas power installation which is under construction is 340 000 kW. The work safety in coal mine in 2006 was the best of the nearly 30 years.

Huainan Mining Group Co. Ltd. locates in the interior of economically developed regions in east China, north central Anhui province. It has advantageous location and convenient transportation. Huainan coal mine area is about 100 km long, 30 km wide, and about 3 000 km^2 , its coal reserves is 50.1 billion tons, and reserve of gas is 592.8 billion m^3 . It is the typical coal mine area in our country whose gas content is high, permeability for gas is low, coal seam is soft and geological conditions are complex. Before 1998, the gas drainage volume was only 5 200 000 m^3 per year due to the low efficiency of gas drainage, thus the gas accidents were common. In order to change this bad situation, Huainan Mining Group united with China University of Mining & Technology and China Coal Re-

search Institute to tackle the key problem of gas control from 1998, and set up an integrated technical system to control gas. The gas drainage volume of 2006 was 173 million m^3 ; the output of raw coal was 33 830 000 t, and the death rate per million tons of coal reduced to 0.18. So far, there are 38 000 domestic gas users in Huainan Mining Group. The total reserve of gas is 200 000 m^3 , and the gas power installation capacity is 32 000 kW. The gas control conceptions of "mining the protective layer when possible, trying to drain gas when ought to, draining before mining" and "expanding money input, appreciating the utilization and promoting draining by using" were quoted by 50 tips on coal mine gas control. Recently, Huainan Mining Group associates many research institutes and enterprises from Germany, Australia and Japan to promote the international exchange and cooperation actively, and conduct the research and development work in the aspect of gas control and utilization.

National Engineering and Research Center (NERC) of Coal Gas Control incorporated by Huainan Mining Group and China University of Mining & Technology was permitted to set up in October, 2005 by National Development and Reform Commission. China University of Mining & Technology (CUMT) is research and development base, and Huainan Mining Group is industrialization base. The engineering center is on the basis of technical researches that are advantageous on technique and products, such as gas geology protection technology, mining coal and draining gas together, mine safety monitoring, gas disaster pre-warning, coal gas utilization, etc. It also follows up the technical developing trend both in home and abroad, and supplies complete advanced technology and equipment for coal gas control, making her contributions to improving coal gas control and utilization of China.

International Symposium on Coal Gas Control in Huainan China (2007) organized by the National Engineering and Research Center (NERC) of Coal Gas Control, China, China Coal Society, Huainan Mining (Group) Co. Ltd., China, China University of Mining & Technology (CUMT), Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia, Deutsche Montan Technologie (DMT), Germany, and Japan Coal Energy Center (JCOAL) will be held during 25 to 28, October, 2007, in Huainai, Anhui province, China. This International Symposium has enjoyed the activate support from scholars from home and abroad. Over 72 papers have been received from China, Germany, Australia and Japan. These papers brief the integrated technology of coal mine gas control, gas drainage and utilization, coal and gas outburst control, gas explosion control, mine safety monitoring and control, ventilation and fire prevention and control. All these reflect the latest outcomes in the aspect of international coal mine gas control and utilization.

October is the golden season for China with nice breeze under the clean sky and comfortable sunshine. Scholars from every country come to Huainan to research and discuss the theory and technique on coal mine gas control and utilization, to exchange

the technical experience of coal mine gas control and utilization. This would play a positive part in boosting the coal mine gas control and utilization. We wish the symposium a complete success and wish you a very pleasant stay in Huainan and all the best with your work.

**Organizing Committee of International Symposium on Coal Gas
Control Technology in Huainan, China**

September, 2007

目 录

前言.....	(1)
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第一篇 煤矿瓦斯综合防治技术

淮南矿区瓦斯治理与利用	袁亮(3)
中国煤矿煤与瓦斯突出现状及防治对策	付建华,程远平(11)
德国矿井高产高效工作面瓦斯抽采	Joachim Brandt, Rainer Sdunowski(22)
日本能源中心基于安全项目综述	Hirofumi Furukawa(30)
煤矿瓦斯涌出的综合预测方法	Hua Guo, Deepak Adhikary(36)
煤岩电磁辐射技术及应用	何学秋,王恩元,刘贞堂,等(49)
德国在深井高瓦斯煤矿的高效长壁开采中采用的瓦斯 控制思路和技术	Michael Bauer(57)
中国煤矿区域性瓦斯治理技术的发展	程远平,俞启香(76)
高瓦斯低透气性复合煤层群开采矿区的瓦斯综合治理	李国君(87)

第二篇 煤矿瓦斯抽采及利用技术

德国无烟煤煤矿煤层瓦斯预抽	Dr. Erwin Kunz(95)
计算流体力学模拟在地下开采瓦斯流动及自然发火 控制中的应用	Ting Ren, Rao Balusu(100)
综放面围岩移动影响下瓦斯运移规律研究	李树刚,潘宏宇,张天军,等(115)
巨厚关键层下远程被保护层裂隙演化及卸压瓦斯抽采 研究	王亮,程远平,李凤荣,等(120)
中曲率半径钻孔——一种新兴的瓦斯抽采 技术	Patrick Humphries, Alison Booth(127)
超远距离被保护层采动裂隙发育对卸压瓦斯抽采影响的 研究	刘洪永,程远平,周红星,等(140)
澳大利亚矿井瓦斯防治技术及 应用	Rao Balusu, Patrick Humphries, Hua Guo,等(148)
高强度采动含瓦斯煤体渗透率演化规律研究	齐庆新,李宏艳,邓志刚,等(173)
破碎煤岩瓦斯流动模拟	Brett Poulsen, Baotang Shen(178)
确定地面钻井抽采瓦斯半径的机理与方法研究	张国枢,袁亮,戴广龙,等(191)
低浓度瓦斯治理和利用的技术方案	Shi Su, Philip Teakle(195)
煤矿瓦斯利用与液化提纯	金学玉(210)

煤矿井下瓦斯抽采现状及存在问题分析	翟成, 林柏泉(213)
深井松软煤层保护层高效综采面瓦斯治理技术	秦永洋, 高松(219)
矿井卸压瓦斯飘聚现象观察与综放面瓦斯综合治理	刘彦斌(224)
极软突出厚煤层实现高产高效的瓦斯防治技术途径	董钢锋, 练友红(230)
中厚煤层瓦斯抽放方案优化	陈向军, 司朝霞, 肖东辉(236)
高瓦斯易自燃坚硬厚煤层综放面瓦斯涌出规律研究	许满贵(241)

第三篇 煤矿煤与瓦斯突出防治技术

区域性防突预报新技术——防突预测图在淮南矿区防突

工作中的运用	周德昶, 张瑞(249)
煤与瓦斯突出预测技术发展现状及前景	王恩元, 何学秋, 宋晓艳, 等(253)
淮南矿区突出煤层掘进工作面防突技术	柏发松(262)
突出区域预测瓦斯地质法研究与应用	廖斌琛(270)
煤与瓦斯突出矿井安全煤量研究及应用	王海锋, 程远平, 俞启香, 等(280)
复杂应力状态下煤岩电磁辐射特性实验研究	刘贞堂, 王恩元, 何学秋, 等(287)
延时煤与瓦斯突出的人工智能预警理论与关键技术 研究	罗新荣, 夏宁宁, 贾真真, 等(294)
石门(井筒)揭煤快速测压技术	童云飞, 方有向, 高艳忠(301)
煤层注水防突电磁辐射响应的理论基础研究	李忠辉, 王恩元, 何学秋, 等(308)
突出煤层采空区侧巷道合理位置研究	周红星, 程远平(314)
利用地震 P 波确定煤层瓦斯富集带的分布	钱进, 崔若飞, 陈同俊, 等(321)
潘一矿突出预测指标敏感性研究	袁军伟, 蔡如法, 王兆丰, 等(327)
基于电磁辐射原理的工作面异常区域确定研究	赵恩来, 刘晓斐, 王恩元, 等(332)
利用波阻抗反演解释煤层岩性的方法研究	陈同俊, 崔若飞, 许永忠, 等(339)
深部煤层冲击的瓦斯异常特性及治理研究	刘晓斐, 赵恩来, 王恩元, 等(345)
岩巷掘进诱发煤与瓦斯突出过程的数值模拟	徐涛, 唐春安(350)
含瓦斯煤岩突出流变分析及非接触预测技术	王云刚, 王恩元, 何学秋, 等(358)
水力挤出消突措施合理注水压力研究	刘军, 王兆丰, 杨宏民(365)
煤岩体声发射传播特性及试验研究	邹银辉, 董国伟, 李建功(369)
煤岩摩擦声电效应的实验研究	邓洪波, 王恩元, 杨明, 等(377)
基于 C#.NET 技术的煤与瓦斯突出集成预测系统	印耿(384)

第四篇 煤矿瓦斯爆炸防治技术

煤矿瓦斯爆炸研究现状及综合分析	林柏泉, 叶青(393)
澳大利亚基于瓦斯含量的煤与瓦斯突出防治技术	Sheng Xue(405)
多孔金属材料对瓦斯爆炸传播抑制技术	叶青, 林柏泉(413)
煤矿重特大瓦斯事故关键链控制研究	吴祥, 程远平, 刘静, 等(420)
自然风压与瓦斯事故	谭允祯, 商岩冬, 赵文彬(427)

第五篇 煤矿瓦斯安全监测监控技术

- 煤矿声发射信号噪声的滤除 童敏明,冯英波,徐剑坤,等(433)
- 光纤传感二次谐波检测瓦斯技术的研究 周孟然,袁亮,李振壁,等(438)
- 矿井巷道层次型无线监测无线传感器网络的实现 王彬,杨维(443)
- 甲烷在钼电极上的电化学反应研究 张利琴,张国梅,双少敏,等(450)
- 甲烷气体浓度的检测方法及其装置 周岱子,郭芬,李忠平,等(455)
- 光纤化学传感器在甲烷分析检测中的研究新进展 张益霞,董川,张利琴,等(458)

第六篇 煤矿通风防灭火技术

- 基于通风数据的异常巷道分析 Masahiro Inoue, Bingrui Li (467)
- 煤岩瓦斯突出危险长壁工作面通风
系统 Piotr Kolodziejczyk, Marek Wesolowski (479)
- 装备提升容器的通风井筒非稳态活塞风研究 王海桥,田峰,吴强(497)
- 大采长综放面瓦斯综合治理优化模拟实验研究 王义江,杨胜强,凌志迁(503)
- 主要通风机扩散器结构形式与效率的关系分析 陈世强,王海桥,冯涛,等(509)
- 基于 PLC 的掘进面智能通风控制系统研究 侯友夫,尹逸,徐达(516)
- 淮南矿区急倾斜煤层自然发火预测预报体系 杨宏民,王兆丰,罗海珠,等(522)

第七篇 其 他

- 煤与其他矿业的联系和结果的可持续发展
讨论 Per Nicolai Martens, Jose B. Pateiro Fernandez, Tobias Katz (531)
- ZJC 系列车载矿山救灾指挥系统研制 王理(541)
- 煤层气水合物生成实验研究 赵建忠,石定贤,赵阳升(545)
- 三软煤层沿空掘巷围岩综合控制技术及工程应用 阙甲广,张农,李桂臣,等(550)
- 砂川矿瓦斯突出及瓦斯爆炸的预防措施——瓦斯抽放法 池田纪文(557)
- 煤矿瓦斯灾害预防措施与管道系统 中岛 严(563)

Contents

Foreword	(1)
----------------	-----

Part 1 Comprehensive Gas Control Technology

Gas Control and Utilization in Huainan Mining Area	Yuan Liang (3)
Situation and Prevention Countermeasures of Coal and Gas Outburst in Chinese Coal Mines	Fu Jianhua, Cheng Yuanping (11)
Gas Drainage in High Efficiency Workings in German Coal Mines	Joachim Brandt, Rainer Sdunowski (22)
Overview of the JCOAL Project on Safety	Hirofumi Furukawa (30)
Integrated Approach to Mine Gas Emission Prediction	Hua Guo, Deepak Adhikary (36)
Electromagnetic Radiation Technology for Coal or Rock and Its Application	He Xueqiu, Wang Enyuan, Liu Zhentang, et al (49)
High Performance Longwall Mining in Deep and Methane Rich Coal Deposits in Germany Taking into Account Methods and Technologies for Controlling the Estimated Gas Liberation	Michael Bauer (57)
Development of Regional Gas Control Technology in Chinese Coal Mines	Cheng Yuanping, Yu Qixiang (76)
Comprehensive Gas Control in Mining Multiple Coal Seams with High Methane Content and Low Permeability	Li Guojun (87)

Part 2 Technology of Gas Drainage and Utilization

Predegassing of Coal Seams in German Hard Coal Mines	Dr. Erwin Kunz (95)
Applications of CFD Simulations for Mine Gas and Spontaneous Heatings Control in Underground Coal Mines	Ting Ren, Rao Balusu (100)
Study on Gas Delivery Feature Influenced by Movement of the Surrounding Rock of Fully- Mechanized Top Coal Caving	Li Shugang, Pan Hongyu, Zhang Tianjun, et al (115)
Study on the Law of Fractures Evolution and Extraction of Pressure Relief Gas Under the Hugely Thick Key Stratum in Long Distance	Wang Liang, Cheng Yuanping, Li Fengrong, et al (120)
Medium Radius Drilling, an Emerging Gas Drainage Technology	Patrick Humphries, Alison Booth (127)

On the Effect of the Mining Fissure in the Super-remote Protected Seams to the Pressure-relief Gas Drainage	<i>Liu Hongyong, Cheng Yuanping, Zhou Hongxing, et al</i>	(140)
Mine Gas Control Technologies and Practices in		
Australia	<i>Rao Balusu, Patrick Humphries, Hua Guo, et al</i>	(148)
Study on the Evolution Law of Mining Coal		
Permeability	<i>Qi Qingxin, Li Hongyan, Deng Zhigang, et al</i>	(173)
Modelling of Gas Flow in Fractured Rock and Coal	<i>Brett Poulsen, Baotang Shen</i>	(178)
Study on the Mechanism and Method of Detecting Gas Drainage Radius from Coal Seam		
with Drilling Well on Surface	<i>Zhang Guoshu, Yuan Liang, Dai Guanglong, et al</i>	(191)
Technical Options for Diluted Mine Methane Mitigation and		
Utilisation	<i>Shi Su, Philip Teakle</i>	(195)
Coal Mine Gas Utilization and Liquefied Purification	<i>Jin Xueyu</i>	(210)
The Analysis of the Current Situation and Problems of Degassing in Coal		
Mines	<i>Zhai Cheng, Lin Baiquan</i>	(213)
High Efficiency Full Mechanized Coal Face Gas Control Technology of Soft Protective		
Seam in Deep Mine	<i>Qin Yongyang, Gao Song</i>	(219)
The Observation of Coal Mine Press-relief Gas Accumulation Phenomenon and The		
Comprehensive Gas Control of Full-mechanized Caving Face	<i>Liu Yanbin</i>	(224)
Gas Control Technical Approaches of High Efficiency Workings in Very Soft and		
Thick Outburst Coal Seam	<i>Dong Gangfeng, Lian Youhong</i>	(230)
Optimization Scheme of Methane Drainage in Medium-thick Coal		
Seam	<i>Chen Xiangjun, Si Zhaoxia, Xiao Donghui</i>	(236)
Study on the Rule of Methane Effusion of Full-Mechanized Top Coal Caving in Thick,		
Hard, Self-ignite and High-gas Seam	<i>Xu Mangui</i>	(241)

Part 3 Coal and Gas Outburst Control Technology

New Regional Outburst Prevention and Prediction Technology—the Application of		
Outburst Prediction Graph in Outburst Prevention in Huainan Mine		
Area	<i>Zhou Dechang, Zhang Rui</i>	(249)
Current Situation and Prospect of Coal and Gas Outburst Forecast		
Technology	<i>Wang Enyuan, He Xueqiu, Song Xiaoyan, et al</i>	(253)
The Outburst Prevention Technology in Outburst Coal Seam Drivage Face in		
Huainan Mine Area	<i>Bai Fasong</i>	(262)
Study on the Method of Outburst Region Prediction Gas Geological and Its		
Application	<i>Liao Binchen</i>	(270)
Research on Safety Coal Quantity and its Application to Coal and Gas Outburst		
Mine	<i>Wang Haifeng, Cheng Yuanping, Yu Qixiang, et al</i>	(280)
Experimental Study on Electromagnetic Radiation Characteristics of Coal or Rock under		
Complex Stress	<i>Liu Zhentang, Wang Enyuan, He Xueqiu, et al</i>	(287)

Research on Artificial Intelligence Alarm Theory and Key Technology to the Delay	
Coal and Gas Outburst	Luo Xinrong, Xia Ningning, Jia Zhenzhen, et al (294)
Rapid Pressure Measuring Technology of Rock Cross-cut (Shaft) Coal	
Uncovering	Tong Yunfei, Fang Youxiang, Gao Yanzhong (301)
Theoretical Study of Electromagnetic Radiation Response of Coal and Gas Outburst	
Prevention with Water Infusion in Coal	
Seam	Li Zhonghui, Wang Enyuan, He Xueqiu, et al (308)
Study on Proper Lane Situation along Goaf Side in Outburst	
Seam	Zhou Hongxing, Cheng Yuanpin (314)
Locating the Distribution of Coalbed Methane Enriched Area Using Seismic P-wave	
Data	Qian Jin, Cui Ruofei, Chen Tongjun, et al (321)
Study about the Forecast Index of Coal and Gas Outburst Sensitive in PanJi 1st	
mine	Yuan Junwei, Cai Rufa, Wang Zhao Feng, et al (327)
Study of Determination of Abnormal Region in Working Face Based on Electromagnetic	
Radiation Principle	Zhao Enlai, Liu Xiaofei, Wang Enyuan, et al (332)
Study on Method of Using Impedance Inversion to Interpret Coal	
Lithology	Chen Tongjun, Cui Ruofei, Xu Yongzhong, et al (339)
Character of Rock Burst Going with Abnormal Gas and Its Elimination in Deep Coal	
Seam	Liu Xiaofei, Zhao Enlai, Wang Enyuan, et al (345)
Modelling of Coal and Gas Outburst Induced by Rock Drift	
Driving	Xu Tao, Tang Chun'an (350)
Rheological Analysis of Coal and Gas Outburst and Its Noncontact Prediction	
Technology	Wang Yungang, Wang Enyuan, He Xueqiu, et al (358)
Study on the Rational Watering Pressure of Hydraulic Extrusion Measure for	
Prevention of Outburst	Liu Jun, Wang Zhao Feng, Yang Hongmin (365)
Propagation Characteristic and Relevant Experimental Study of Acoustic Emission in	
Coal and Rock Body	Zou Yin hui, Dong Guo wei, Li Jiangong (369)
Experimental Study of the Acoustic-electric Effect in Coal or Rock Friction	
Process	Deng Hongbo, Wang Enyuan, Yang Ming, et al (377)
Integrated Prediction System of Coal and Gas Outburst Based on C#. NET	
Technology	Yin Geng (384)

Part 4 Gas explosion control Technology

The Present Situation and Comprehensive Analysis of Gas Explosion in Coal	
Mine	Lin Baiquan, Ye Qing (393)
Gas Content Based Outburst Control Technology in Australia	Sheng Xue (405)
The Study on Suppression Technology of Methane Explosion Propagation in Porous	
Metallic Materials	Ye Qing, Lin Baiquan (413)
Research on the Control of Accident Key Chain of Severe and Great Gas Accidents in	