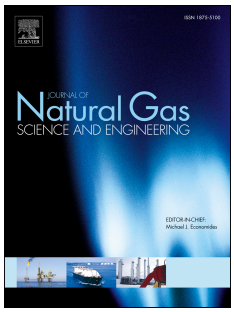
Accepted Manuscript



Mechanical behaviour and permeability evolution of gas-containing coal from unloading confining pressure tests

Yi Xue, P.G. Ranjith, Feng Gao, Decheng Zhang, Hongmei Cheng, Zhaohui Chong, Peng Hou

PII: S1875-5100(17)30081-1

DOI: 10.1016/j.jngse.2017.02.030

Reference: JNGSE 2083

To appear in: *Journal of Natural Gas Science and Engineering*

Received Date: 12 July 2016

Revised Date: 9 February 2017

Accepted Date: 13 February 2017

Please cite this article as: Xue, Y., Ranjith, P.G., Gao, F., Zhang, D., Cheng, H., Chong, Z., Hou, P., Mechanical behaviour and permeability evolution of gas-containing coal from unloading confining pressure tests, *Journal of Natural Gas Science & Engineering* (2017), doi: 10.1016/j.jngse.2017.02.030.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Mechanical behaviour and permeability evolution of gas-containing coal from unloading confining pressure tests

Yi Xue [a], P.G. Ranjith [b], Feng Gao [a], Decheng Zhang [b], Hongmei Cheng [a], Zhaohui Chong [c], Peng Hou [a]

a State Key Laboratory for Geomechanics and Deep Underground Engineering, China University of Mining and Technology, Xuzhou, 221116, China

b Deep Earth Energy Laboratory, Department of Civil Engineering, Monash University, Building 60, Melbourne, Victoria 3800, Australia

c School of Mines, China University of Mining and Technology, Xuzhou, 221116, China

Abstract

Underground coal mining usually develops vertical stresses and reduces the horizontal stress in front of the coal face, which may trigger the occurrence of coal ruptures and gas outburst hazards. According to the stress change characteristics of the working face using different mining methods, different loading paths (constant confining pressure path and unloading confining pressure path) were selected in this study. Methane permeability tests of coal samples under different loading and unloading paths were conducted. Based on these tests, the effects of the unloading rate on the mechanical behaviour and permeability evolution (including energy evolution and fractal dimension) of the coal was investigated quantitatively. The tests revealed that the higher confining pressure unloading rates yielded a lower compressive strength and ductile strain. The increase in the unloading rate reduced the elastic energy and dissipation energy of the samples. Moreover, the higher unloading rate corresponded to more complex failure structures of coal and a greater fractal dimension, which resulted in greater permeability after the rupture of the coal samples. Furthermore, the higher unloading rates accelerated the rock damage rate and the permeability increase rate, which had a notable effect on the emergence of gas outburst hazards.

Download English Version:

https://daneshyari.com/en/article/5485092

Download Persian Version:

https://daneshyari.com/article/5485092

Daneshyari.com