

## 底层大采高综放全厚开采20 m特厚中硬煤层的物理模拟研究

康天合<sup>1</sup>, 柴肇云<sup>1</sup>, 李义宝<sup>1</sup>, 葛耀勇<sup>2</sup>, 张会斌<sup>2</sup>, 刘瑞荣<sup>2</sup>

(1. 太原理工大学 采矿工艺研究所, 山西 太原 030024; 2. 内蒙古伊泰集团有限公司 伊泰煤炭股份有限公司, 内蒙古自治区 鄂尔多斯 017000)

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**摘要** 根据酸刺沟煤矿6-1#煤层的赋存条件, 运用1: 30的大比例物理模拟试验, 研究底层4.5 m大采高综放全厚开采20 m特厚煤层顶煤和顶板垮落特征、采空区垮落矸石的碎胀特性和堆积角、支架的工作阻力、煤炭回收率以及煤壁前方支承压力的作用特征等。研究表明: (1) 底层大采高综放全厚开采20 m特厚中硬煤层, 在技术上是可行的。(2) 根据顶煤、顶板垮落特征, 工作面的开采过程可分为初采阶段、过渡阶段和正常放煤阶段。在初采与过渡阶段, 煤炭回收率 $n$ 随工作面推进距离 $L$ 的增加呈对数规律提高。(3) 进入正常放煤后, 顶煤放出率可以达到70%, 工作面采出率可以达到75%。顶煤放出率随顶板岩梁的垮落呈周期性变化。(4) 在支架后方会出现大厚度顶煤悬伸, 顶板周期性垮落时会发生大高度切顶现象, 要求支架有足够的抵抗顶煤、顶板断裂产生的向后旋转作用力。(5) 为确保安全和顶煤及时垮落, 应实施预爆破或预注水弱化顶煤措施。

**关键词** [采矿工程](#); [底层大采高](#); [20 m特厚中硬煤层](#); [矿压特征](#); [煤炭回收率](#)

分类号

## STUDY ON PHYSICAL SIMULATION OF FULL-SEAM MINING FOR A 20 m VERY THICK AND MEDIUM HARD SEAM BY SUB-LEVEL CAVING MINING WITH HIGH BOTTOM CUTTING HEIGHT

KANG Tianhe<sup>1</sup>, CHAI Zhaoyun<sup>1</sup>, LI Yibao<sup>1</sup>, GE Yaoyong<sup>2</sup>, ZHANG Huibin<sup>2</sup>, LIU Ruirong<sup>2</sup>

(1. Institute of Mining Technology, Taiyuan University of Technology, Taiyuan, Shanxi 030024, China;  
2. Coal Co., Ltd., Inner Mongolia Yitai Group Co., Ltd., Erdos, Inner Mongolia Autonomous Region 017000, China)

### Abstract

Based on the condition of No.6-1 coal seam of Suancigou Coal Mine, the caving characteristics of the top coal and roof, the bulk increase property and the stacking angle of the caved rock behind the powered support, the working resistances of the powered support and the coal face recovery etc. of the fully-mechanized sub-level caving full-seam mining with high bottom cutting height for the 20 m very thick and medium hard seam have been studied by 1: 30 physical simulation. Some conclusions can be drawn as follows. (1) It is feasible in technology to use full-seam mining for the 20 m very thick and medium hard seam by fully-mechanized sub-level caving mining with high bottom cutting height. (2) According to the top-coal caving and drawing characteristics, the mining process of working face may be divided into the initial mining stage, the transition stage and the top-coal normal caving stage in which the face coal recovery ratio  $n$  increases in a logarithmic form within certain distance of the face advance. (3) The coal face recovery may reach to 75% in the normal top-coal caving stage and the face coal recovery changes with the roof rock beam breaking periodically. (4) There are the phenomena of the full top coal cantilevering towards mined-area and then suddenly cutting down over the bottom working face wall. The front-rear stability of the powered support must be considered when designing and electing the support. (5) In order to ensure safety and top coal caving in time, the measures of pre-blasting or water pre-infusion to weaken top coal should be adopted.

**Key words** [mining engineering](#); [high bottom cutting height](#); [20 m very thick and](#)

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