

论文

长壁矸石充填开采上覆岩层移动特征模拟实验

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摘要:

长壁矸石充填工作面采空区由于被充填材料占据, 上覆岩层移动特征将不同于垮落法管理顶板, 采用相似模拟和数值计算模拟工作面回采和矸石充填过程。通过改变支架初撑力和工作阻力、充填材料的夯实力, 模拟不同充填率情况下上覆岩层应力变化和岩层移动特征, 结合现场实测结果认识长壁矸石充填开采上覆岩层移动规律。研究发现: 支架工作阻力对充填效果影响显著, 充填支架高初撑力和工作阻力可以限定顶板的变形, 保证足够的时间使更多的充填材料充进采空区, 进而减小缓慢下沉带高度, 控制地表变形。采空区内充填材料限制直接顶的变形、下沉以及冒落, 直接顶以断裂和冒落为主, 冒落后整齐地排列在采空区矸石上。基本顶以弯曲下沉形式随直接顶移动, 上覆岩层冒落高度显著降低。

关键词: 矸石充填开采; 覆岩移动; 模拟实验; 充填支架

Simulation experiment of overlying strata movement features of longwall with gangue backfill mining

Abstract:

The movement features of overlying strata are different from that of mining by caving method since gob areas are occupied by fillings, and the processes of faces mining and gangue filling were simulated in laboratory by numerical calculations. Stress changes and movement features of overlying strata were simulated under different filling ratio conditions by the approaches of changing the initial support power, working resistance of support, and tamping forces of filling material, then by combining field measured results, the regularity of overlying strata was revealed. And three main conclusions were drawn in this research as follows: working resistance of support play a significant role to the filling effects, high initial power and working resistance of support can restrict deformation of roof and ensure enough time to fill more filling materials to gob area, thus can decrease the height of gradual subsidence zone and regulate surface deformation. Immediate roof is regulated by gob area's filling materials, which can control the deformation, subsidence and caving of immediate roof. Rupture and collapse are the main forms of immediate roof. And then it arranges in good order on goaf waste rock after collapse. Forms of main roof, which correspond to immediate roof shifting, are in curve subsidence types. Besides, the collapse height of overlaying strata will reduce strikingly.

Keywords: gangue backfill mining; overlying strata movement; simulation experiment; stowing support

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