

论文

全煤巷道锚杆锚索联合支护机理与效果分析

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摘要:

以同煤大唐塔山煤矿全煤巷道为例, 采用有限差分数值计算软件FLAC 3D, 对不同顶煤厚度、不同巷道布置位置、不同巷道高宽比、不同地应力大小、不同锚杆锚索预紧力等情况下巷道围岩受力与变形特征进行了研究。结果表明: 顶煤厚度在10 m以内时, 随着顶煤厚度增加, 应力集中区范围扩大, 应力值降低; 巷道掘进与相邻工作面回采后在煤柱中形成的应力集中区呈近似“三角形”的分布特征; 相同巷道高度下, 随着巷道宽度增加, 顶煤应力集中程度增加, 底板岩体中应力值却降低; 煤岩体强度越高, 围岩应力值越大; 锚杆锚索联合支护时, 锚杆与锚索施加的预紧力应在锚固结构中形成相互连接、相互叠加的压应力区。井下试验表明, 强力锚杆与锚索联合支护有效控制了巷道围岩变形, 为全煤巷道提供了有效的支护手段。

关键词: 全煤巷道; 锚杆; 锚索; 支护效果

Analysis on mechanism and effect of rock bolts and cables in gateroad with coal seam as roof

Abstract:

Taking a tailgate with coal seam as roof in Tashan Coal Mine in Datong mining district for example,the numerical simulation of stress and deformation characteristics in the rock surrounding the tailgate was studied,with different thickness of roof coal,different tailgate locations,different heightwidth ratios,different insitu stress and different pretension of bolts and cables through finite difference numerical software FLAC 3D.The results show that as the thickness of roof coal increases,the stress concentration area enlarges while the stress decreases within the roof coal of less than 10 meters;the distribution of stress concentration area in the coal pillars caused by the tailgate driving and adjacent longwall face mining is in the shape of “triangle”;with the same tailgate height,as the tailgate width increases,the stress concentration in the roof coal increases while the stress in the floor decreases;the higher the strength of coal and rock is,the higher the surrounding rock stress is;the bolt and cable pretension should form an effective compression stress zone which is supposed to overlap in anchorage range in surrounding rocks.The underground tests showed that the high strength and high pretension bolt and cable can effectively control the deformation of the surrounding rocks,provide an effective approach to support the gateroads with coal seam as roof.

Keywords: gateroads with coal seam as roof; rock bolt; cable; supporting effect

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