

论文

锚杆预紧力对锚固体强度强化的模拟实验研究

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摘要:

锚杆预紧力在巷道支护中发挥着重要作用, 但其对锚固体强度强化特征的研究仍存在不少问题; 以砂蜡材料、预紧力锚杆和平面应变约束装置制作锚固分离体, 在RMT-150C实验机上对其力学特性进行了研究。实验结果表明: 锚固体的峰值强度、残余强度的强化系数和岩体强度、锚杆预紧力呈正相关, 岩体强度一定时, 随着锚杆预紧力的增大, 强化系数逐渐增加, 锚杆预紧力对锚固体峰后残余强度的强化大于对锚固体峰值强度的强化。锚固体的应变-应力全程曲线与锚杆受力存在着对应关系, 锚固体屈服之前, 锚杆受力增加缓慢; 屈服点之后, 受力急剧增加; 峰后软化阶段锚杆受力逐渐增加, 摩擦阶段锚杆受力处在不断的调整下降中。预紧力一定时, 岩体强度越高, 锚杆受力增加幅度越小; 岩体强度一定时, 高预紧力锚杆受力增幅较小; 软弱岩层破坏后, 锚杆载荷的损失比坚硬岩层大, 预紧力锚杆对软弱岩层的作用比坚硬岩层明显。现场实践表明, 提高锚杆预紧力能够有效控制围岩的变形。

关键词: 锚杆; 预紧力; 锚固体; 强度强化

Analogy simulation test on strengthening effect for pretention of bolts on anchorage body

Abstract:

Bolt pretension has an important part in roadway support, but the study on strengthening characteristics of anchorage body with pre stressed bolts still has many problems. Mechanics characteristics of detached anchorage body was researched by using RMT-150C testing machine, which was fabricated by wax sand, pretension bolts and plain strain restrain device. The results indicate that strength enhancement factor of peak strength, residual strength are positive correlation with rock strength and pretension of bolts. Strength enhancement factor is gradually increasing with pretension when rock strength is constant, and the residual strength enhancement factor of pretention of is greater than that of peak. There are corresponding relationship with stress strain curve and bolts loads. Congruent relationship exists between stress strain curve and bolt load. Before surrender point, bolt load increases slowly; however which increases rapidly after surrender point. Bolt load increases gradually on post peak points, and constantly descends on flow phase. The higher strength of rock is, the lower increase rate of bolts loads are with the same pretension. The increase rate smaller is, the higher pretension is with the same rock. The loss of pretension in failure stage is much more of soft rock than that of hard rock. The strengthening effect in soft rock is obvious than that of in hard rock. Site practice shows that surrounding rock deformation can be decreased effectively with high bolt pretension.

Keywords: bolt; pretension; anchorage body; strength enhancement

收稿日期 2011-11-11 修回日期 2012-03-14 网络版发布日期 2013-01-05

DOI:

基金项目:

国家自然科学基金资助项目 (50874037, 51174078); 河南理工大学博士基金资助项目(82012-077)

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