

论文

半硬半软岩隧道塌方的力学特性及处理方法分析

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摘要:

由于蛟岭隧道出口横断面一半为硬岩, 结构完整, 而另一半为软岩, 为风化岩层, 且较为破碎, 所以在隧道开挖时, 硬岩一侧刚度较大, 变形较小, 自稳能力大; 软岩一侧与之相反, 遇水软化, 流变性明显, 所以在软硬岩界面处, 产生滑移, 导致塌方, 从而在软岩一侧采取了地表加固和掌子面管棚注浆的处理, 形成了与硬岩接近的强度, 使隧道周围形成一个承载环, 并对处理段进行了监测, 监测数据分析表明处理后迅速达到稳定。

关键词: 半硬半软岩 隧道塌方 管棚 注浆 地表加固 蛟岭

MECHANICAL CHARACTERISTICS AND TREATMENT METHOD OF COLLAPSE OF TUNNEL WITH HALF-HARD AND HALF-SOFT ROCKS ALONG ITS TRANSVERSE SECTION

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Abstract:

The Jiaoling tunnel in construction encountered two types of rocks along its transverse section. Half of the tunnel section is hard-rock while the other half is soft rock. The hard rock is intact and has a 40 MPa compressive strength. The soft rock is weathered and fractured and has a compressive strength 5MPa. Collapse at the side of soft rock took place during the construction. Mechanical characteristics for the hard and soft rocks and the collapse reasons were analyzed at the portal of the left tunnel line. Then counterpart collapse treatments were employed. For example, surface with grouting reinforcement and tube-grouting frame were explained. Strength of the treated soft rock was almost equal to that of hard rock. Bearing loop was made up of treated soft rock and hard rock. At last the treated zone was monitored. It was judged from monitoring data that the zone was stable quickly. So, this treatment method is reasonable and effective. The bearing loop theory can be used to the half-hard and half-soft rock transverse-section tunnel. New idea in the paper is the suspension theory applicable to bolting and grouting-tube treatment of soft rock tunnel. This theory can improve the effectiveness of bolt reinforcing soft rock tunnel. This conclusion in the paper is useful for design and construction of tunnel in half-hard and half-soft rock.

Keywords: Hard rock, Soft rock, Rock tunnel, Collapse, Tube frame, Grouting, Surface with grouting reinforcement, Jiaoling

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