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论文

地质雷达在胶州湾海底隧道F_{4-5}含水断层超前预报中的应用

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摘要：

青岛胶州湾海底隧道地质条件复杂,隧址区含有多组高陡倾角断层,因此隧道在通过海域段涌水断层时的安全便成了工程建设过程中的关键问题.以此为背景,根据在胶州湾海底隧道左线隧道F_{4-5}含水断层利用地质雷达对破碎围岩和裂隙水进行超前预报中的应用,针对信号采集和数据处理解析过程中各影响因素,采取相应的处理措施,最大限度地去除干扰,最后得出清晰准确的测线伪彩色成果图及测线波形图等成果,并从成果图中统计了探测范围内的结构面和裂隙发育的具体位置和规模、裂隙水发育位置等参数,为超前预注浆加固提供了参数.对开挖后的地质情况进行地质编录,验证了本次地质雷达预报的准确性与有效性.所采用的方法措施对于海底隧道地质雷达超前地质预报具有一定的借鉴意义.

关键词： 胶州湾海底隧道;地质雷达;超前地质预报;含水断层

Application of ground penetrating radar to the geological forecast for water-bearing faults in the Jiaozhou Bay subsea tunnel construction

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Abstract:

The geological conditions of the Qingdao Jiaozhou Bay subsea tunnel are complex, which include many groups of faults with a large dip angle, and therefore how to ensure the security of the tunnel in fault rich water is a key problem in engineering construction. The application of geological radar was introduced for detecting the fragmented rock and fissure water in F_{4-5} water bearing faults in the left line of the Jiaozhou Bay subsea tunnel. For the influencing factors during data gathering and data analysis, some measures were used to reduce the interference, and the achievements such as pseudo-color survey line graph and survey line oscillogram were obtained. The achievements depict the growth scale, position and water situation of the F_{4-5} fault. The parameter of the exact location and size of the fracture and the location of fracture and cracks in the fault zone were also provided. At the same time the geological forecast provided parameters for advanced grouting. The later geological compilation after the excavation confirmed the accuracy and validity of this geological radar forecast and the mentioned measures certainly have reference mearing to ground penetrating radar application on subsea tunnels.

Keywords: JiaoZhou Bay subsea tunnel; ground penetrating radar; advanced geological forecast; water-bearing fault

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