

论文

冻结法成井井壁在深厚表土段附加应力研究

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摘要:

为研究深厚表土段井壁的破坏机理, 提高井筒的使用寿命, 指导已破坏井筒维修和为新设计井筒提供依据, 采用数值模拟和理论计算相结合的方法, 对淮北煤田深厚表土段井壁附加应力的产生原因及大小进行了探讨。结果表明: 附加应力由井壁和裹挟土体重量产生, 与地下水埋藏深度、土的容重、地下水层数有关, 地下水埋藏越深, 产生的附加应力越大, 在基岩表面处的附加应力为89.91 MPa, 远远超过了混凝土井壁的抗压强度。为避免井筒破坏, 应采用方法是: 增加井壁强度、保持原有水压、设法减少锥体的重量、井壁在应力集中处采用伸缩装置。

关键词: 深厚表土; 附加应力; 井壁破坏; 冻结法

Additional stress of shaft linings in thick alluvium constructed by freezing process

Abstract:

To analyze the failure mechanism of shaft lining in thick alluvium and improve its service life, direct reparation for broken shaft lining, and provide evidence for new shaft lining design, this paper researched the reasons of shaft lining additional stress in Huaibei coalfield, combined numerical simulation and theoretical calculations. The results show that the additional stress is generated by weight of shaft liner and incidental conical soil, which is related to the groundwater depths, soil bulk density, and groundwater layer number. The deeper the groundwater is, the larger the additional stress is. The additional stress in bedrock surface reaches 89.91 MPa, which is far more than concrete compressive strength. In order to avoid shaft lining breakage, some measures are taken, for example, increasing shaft lining thickness, maintaining original hydraulic pressure, reducing the weight of incidental conical soil and using expansion device in stress concentration area.

Keywords: thick alluvium; additional stress; shaft lining breakage; freezing method

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