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论文

基于采动应力场与微震活动性的岩体稳定性分析

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摘要：

为了研究采矿活动中的应力场、微震活动规律与围岩稳定性之间的关系，依托石人沟铁矿工程实例，详细分析该矿15号勘探线附近区域地下空区形成及露天坑内排过程中围岩体内部微破裂的产生、聚集及演化规律。利用有限元软件ANSYS建立力学模型，模拟不同采矿活动中的应力场分布。然后通过对比同一时期应力场与微震事件分布状态揭示应力场与微震活动性之间的关系：应力状态的改变会诱发岩体内部微破裂（微震活动性）的产生，应力集中会引起微震事件的区域性聚集。结合现场岩体地质状况，发现高能量微震事件大量聚集的区域岩体破坏程度较周围区域更为严重，说明微震事件所释放的能量及事件密度是岩体内部破坏程度的真实反映，因而将它们作为岩体稳定性的评价指标是可行的。最后，基于对以上关系的认识，结合下阶段矿山应力场分布状况预测了石人沟铁矿可能会发生岩体失稳破坏和地质灾害的危险区域，并提出了相应的防治措施。

关键词： 扰动应力场；数值模拟；微震活动；围岩稳定性

Analysis of surrounding rock stability based on mining stress field and microseismicity

Abstract:

Combining with an engineering case of Shirengou iron mine，mainly studied the relation between mining stress field with microseismicity and surrounding rock stability.The law of microfracture production aggregation and evolution was detailed analysised nearby No.15 exploration line during the process of gob formation and open pit internal emission.A mechanical model was established by FEM ANSYS to simulate the mining stress field distribution under different mining conditions.Then the comparison of the stress field distribution and microseism distribution show that the rock microseismicity is induced by the change of stress status and microseism events usually aggregate in the stress concentration regions.By examing the practical field rock mass status，we find the destructiveness of the region where the high energy microseism events aggregate more serious than the surrounding area.The results show that the density and energy of microseism events can reflect destructiveness of rock mass really.It’s reasonable to take them as the rock mass stability evaluation index.At last，based on the understanding of above relationship，combing with the next stage mining stress field，the poor stability rock mass is identified and the the corresponding control measures are pointed out.

Keywords: mining stress field；numerical simulation；microseismicity；rock mass stability

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