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论文

有限元强度折减法在底板突水风险评价中的应用

胡巍，徐德金

中国矿业大学 深部岩土力学与地下工程国家重点实验室 资源与地球科学学院，江苏 徐州 221008

摘要：

介绍了有限元强度折减法在FLAC 3D 中的实现方法。在分析煤层底板突水的有限元计算判断依据的基础上，阐明了底板安全系数Fs1 的意义，即底板实际岩体强度与折减后底板破坏贯通时的岩体强度的比值定义为底板安全系数，它反映了承压水体上底板岩体抵抗破坏贯通的能力。通过有限元强度折减的实例计算验证了将该方法应用于煤层开采底板突水评价的可行性。计算结果表明：案例中工作面底板破坏的计算深度在15 m左右，与实测结果一致，底板安全系数Fs1 为1.38；强度折减法揭示了底板突水的两条潜在的突水路径；底板安全系数Fs1 随着工作面推进距离、工作面斜长及地应力的增大而减小。相较于突水系数，底板安全系数Fs1 考虑因素更多，可信度更高。

关键词： 底板；突水；风险评价；有限元强度折减法；底板安全系数

Application of finite element strength reduction method to risk assessment of groundwater inrush from coal seam floor

Abstract:

Introduced the finite element strength reduction method to the risk assessment for groundwater inrush from coal seam floor.On the basis of analyzing the groundwater inrush criterion of finite element calculation，the meaning of coal floor safety coefficient Fs1 was clarified.And the implementation approach of finite element strength reduction method in FLAC 3D was introduced briefly.At last，the feasibility of this method using in groundwater inrush risk assessment was proved by a calculation of a case.The ratio of the actual rock mechanicals parameters to breaking mechanicals parameters after strength reduction can be seen as the safety coefficient.The numerical results indicate that the depth of fractured floor is about 15 m in the example’s panel and the safety coefficient is 1.38.The safety coefficient reduces with the advance of the working face，the increase of the face length and in-situ stress.Two different water inrush paths are demonstrated by the strength reduction method.Safety coefficient Fs1 is more credible because it considers more factors than the traditional water bursting coefficient.

Keywords: coal seam floor；groundwater inrush；risk assessment；finite element strength reduction method；safety coefficient for coal seam floor

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通讯作者: 胡巍