岩石力学与工程学报　2006 25 (12): 2552　ISSN: 1000-6915　CN: 42-1397/O3

FCJ-GIS动力区划模型及其在斜坡灾害危险性评价中的应用

谭儒蛟1，胡瑞林1，刘衡秋1，曾如意2，梁辉2

(1. 中国科学院 地质与地球物理研究所，北京 100029；2. 中国水电工程顾问集团公司 中南勘测设计研究院，湖南 长沙 410083)

收稿日期 2006-4-6 修回日期 2006-4-24 网络版发布日期 2006-12-31 接受日期 2006-4-6

摘要　斜坡灾害是地质体在各种内外动力耦合作用下的产物，为描述斜坡成灾的动力耦合作用系统中各种内、外动力作用(因子)的贡献程度，提出内外动力因子指标体系和强度等级，引入模糊综合评判法(FCJ)，且建立基于FCJ-GIS的内外动力区划模型，用之来表征内外动力耦合强度特征。然后，将内外动力耦合作用强度和静态环境条件进行叠加分析，提出基于FCJ-GIS内外动力区划模型的斜坡灾害危险性评价新方法。通过虎跳峡河段斜坡灾害的实例研究表明，88%的斜坡灾害体发育在内外动力耦合作用强度高～较高的区域。说明在内外动力耦合作用强度高的区域，斜坡失稳破坏的几率较高；已有的61个斜坡灾害均位于高～较高的危险性区划域内，空间预测的有效率为95%，验证了该方法的可靠性、准确性和可操作性。这一方法可望成为斜坡灾害危险性评价和空间预测新途径，并服务于工程决策与环境管理。

关键词　边坡工程；模糊综合评判法；地理信息系统；内外动力区划；斜坡灾害；危险性评价；虎跳峡

分类号

FCJ-GIS GEODYNAMIC ZONATION MODEL AND ITS APPLICATION TO RISK EVALUATION OF SLOPE HAZARDS

TAN Rujiao1，HU Ruilin1，LIU Hengqiu1，ZENG Ruyi2，LIANG Hui2

(1. Institute of Geology and Geophysics，Chinese Academy of Sciences，Beijing 100029，China；2. Central-southern Hydroelectric Investigation and Design Institute，China Hydropower Engineering Consulting Group Co.，Changsha，Hunan 410083，China)

Abstract

It is a rather well-known fact that slope

hazards are resulted from the coupling of the Earth¢s endogenic and exogenic geodynamic action processes. The endogenic and exogenic geodynamic forces which are relative to slope evolution can be called geodynamic factors. In order to describe the influence of each geodynamic factor contributing to slope hazards in the coupling system，fuzzy comprehensive judgment(FCJ) method is applied；and a geodynamic zonation model based on FCJ-GIS theory is built up to show coupling intensity of geodynamic factors. The zonation model combined with the static environmental elements of the slope can be used to evaluate the slope hazards risk or to forecast the degree of geological hazard occurrence. Through the case study of slope hazards in Tiger-leaping Gorge，the results indicate that there are 88% hazards lying in high geodynamic intensity zonation regions，and then the static environment conditions to risk zonation analysis are unified，nearly 95% hazards in high risk zone. The data prove that the method of slope hazards risk evaluation based on FCJ-GIS geodynamic zonation model is feasible and correct；and the model can provide a new way for slope hazards risk evaluation or forecast.

Key words slope engineering；fuzzy comprehensive judgment(FCJ)；geographic information system(GIS)；geodynamic zonation；slope hazards risk evaluation；Tiger-leaping Gorge

DOI:

通讯作者