

基于微震监测的水电站地下厂房安全性评价研究

张伯虎^{1, 2}, 邓建辉¹, 高明忠¹, 周志辉¹, 吴基昌³, 吴思浩^{3*}

(1. 四川大学 水力学与山区河流开发保护国家重点实验室, 四川 成都 610065; 2. 西南石油大学 土木工程与建筑学院, 四川 成都 610500; 3. 国电大渡河大岗山水电开发有限公司, 四川 石棉 625409)

SAFETY EVALUATION RESEARCH BASED ON MICROSEISMIC MONITORING IN UNDERGROUND POWERHOUSE OF HYDROPOWER STATION

ZHANG Bohu^{1, 2}, DENG Jianhui¹, GAO Mingzhong¹, ZHOU Zhihui¹, WU Jichang³, WU Sihao^{3*}

(1. State Key Laboratory of Hydraulics and Mountain River Engineering, Sichuan University, Chengdu, Sichuan 610065, China; 2. School of Civil Engineering and Architecture, Southwest Petroleum University, Chengdu, Sichuan 610500, China; 3. Dadu River Dagangshan Hydropower Development Co., Ltd., Shimian, Sichuan 625409, China)

摘要

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摘要 将微震监测系统引入水电厂房, 在塌空区域建立精度较高的ISS微震系统, 通过互联网实施远程控制。对获得的大量微震监测进行数据处理, 采用不同方法对塌空区和整个地下厂房进行稳定性分析。从微震事件的时空和能级分布规律对塌空区进行稳定性判断; 采用能量指数法、能量指数与累积视体积法、施密特数与累积视体积法对地下厂房的整体稳定性进行评价; 针对已有监测数据对厂房进行微震震级预测, 建立基于微震监测的水电工程地下厂房安全评价方法。监测结果表明, 厂房下部区域出现的微震较为活跃, 但微震事件震级较小, 离厂房距离也较远; 塌空区进行喷锚加固后, 微震事件较少, 震级也小, 因此地下厂房和塌空区整体是安全的, 其安全性评价方法能对水电工程地下厂房设计和施工提供一定的指导意义。

关键词: 水电工程 微震监测 地下厂房 塌空区 评价方法

Abstract: The microseismic monitoring system is the first time to be established in underground plants of Dagangshan hydropower station in China, which is composed of detector, data acquisition instruments, control and communication system and can be controlled from internet. A lot of seismic events data are processed and different methods are used to analyze the stability of the collapse area and the whole underground plant. First, the stability of rockmass near collapse area is estimated from the spatiotemporal and energy level distribution of seismic events. Second, three methods are used to estimate the overall stability of the powerhouse, such as energy index(EI) method, cumulated apparent volume(CAV) and EI method, Schmidt number and CAV method. Third, the magnitude of seismic events near the powerhouse can be predicted by analyzing the existing monitored data; and the safety evaluation method for underground hydropower plant is set up. The results show that the seismic events are active at the lower part of the plant, but the magnitudes are small and they are a bit far away from the powerhouse. There are less microseismic events near the collapse area after reinforced by shotcrete and anchor. So the underground powerhouse of Dagangshan hydropower station is overall stable. The establishment of safety evaluation method has a good guidance to the design and construction of underground hydropower plants.

Keywords: [hydropower engineering](#) [microseismic monitoring](#) [underground powerhouse](#) [collapse area](#) [evaluation method](#)

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