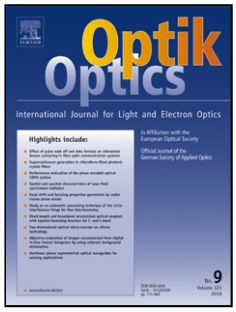

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Author: Xiangnan Qin Chongshi Gu Bo Chen Chungao Liu Bo Dai Yanling Yu

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Multi-block Combined Diagnosis Indexes Based on Dam Block Comprehensive Displacement of Concrete Dams

Xiangnan Qin[1,2,3], Chongshi Gu[1,2,3], Bo Chen[1,2,3], Chungao Liu[1,2,3], Bo Dai[1,2,3], Yanling Yu[1,2,3]

1. State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Hohai University, Nanjing 210098, China

2. National Engineering Research Center of Water Resources Efficient Utilization and Engineering Safety, Hohai University, Nanjing 210098, China

3. College of Water Conservancy and Hydropower Engineering, Hohai University, Nanjing 210098, China

Abstract: Timely diagnosis of the service condition of concrete dam is required to prevent the potential great loss of life and property in case of dam failure. Scientific and reliable diagnosis indexes are significant for effective dam diagnosis. Traditional dam diagnosis focused on displacement at a single point. Rational combined diagnosis based on multi-point displacement is rare. This paper presents a multi-block combined diagnosis method for concrete dam displacement. This method combines comprehensive block displacement and multidimensional confidence region method. The hybrid model, together with structure analysis, is selected to perform prediction. Comprehensive block displacement, a displacement system made up of single-point displacements with different weights, is introduced to describe block displacement. The weights are determined with improved projection pursuit method, which is adept in analyzing and processing high-dimensional data. Multi-block combined diagnosis indexes are then established in multidimensional space based on the residual sequences, and the obtained ellipse diagram can be a straightforward and visualized tool for dam diagnosis. The multi-block combined diagnosis method is recommended because of its high accuracy and reliability.

Key words: dam displacement; hybrid model; comprehensive block displacement; multi-block combined diagnosis index

1 Introduction

Timely analysis of observation data and reasonable diagnosis of dam performance are