

## 边坡工程中监测数据场三维云图实时动态可视化方法

孟永东<sup>1</sup>, 蔡征龙<sup>1</sup>, 徐卫亚<sup>2</sup>, 田 斌<sup>1</sup>, 周建军<sup>1\*</sup>

(1. 三峡大学 水电工程施工与管理湖北省重点实验室, 湖北 宜昌 443002;  
2. 河海大学 水资源高效利用与工程安全国家工程研究中心, 江苏 南京 210098)

## A METHOD FOR THREE-DIMENSIONAL NEPHOGRAM REAL-TIME DYNAMIC VISUALIZATION OF SAFETY MONITORING DATA FIELD IN SLOPE ENGINEERING

MENG Yongdong<sup>1</sup>, CAI Zhenglong<sup>1</sup>, XU Weiya<sup>2</sup>, TIAN Bin<sup>1</sup>, ZHOU Jianjun<sup>1\*</sup>

(1. Hubei Key Laboratory of Construction and Management of Hydropower Engineering, China Three Gorges University, Yichang, Hubei 443002, China; 2. National Engineering Research Center of Water Resources Efficient Utilization and Engineering Safety, Hohai University, Nanjing, Jiangsu 210098, China)

摘要

参考文献

相关文章

Download: [PDF](#) (6415KB) [HTML](#) 1KB Export: [BibTeX](#) or [EndNote](#) (RIS) [Supporting Info](#)

**摘要** 实现监测物理量空间数据场的三维实时动态可视化表达, 是边坡工程安全监测三维可视化在线分析的关键。空间数据场三维可视化最直观的表达形式是三维云图, 其绘制方法包括面绘制和体绘制, 而体绘制方法是实现三维数据场实时动态云图绘制的首选方法。鉴于X3D灵活的场景交互和丰富的三维几何造型节点, 通过生成用于监测数据场三维云图显示的几何载体TEN模型, 在提取监测点坐标并形成监测数据场的基础上, 应用空间插值算法得到TEN网格节点的监测物理量数值, 并按照特定颜色表映射到网格节点的颜色域值, 提出基于X3D技术的空间数据场三维云图体绘制方法。以某水电站坝肩边坡和某水电站谷肩堆积体为例, 应用该方法实现边坡和堆积体监测数据场三维分布云图的实时动态可视化显示, 直观地揭示监测对象的变形趋势和可能的变形破坏模式, 为该方法在水利水电和岩土工程的边坡及地下工程安全监测领域的应用提供参考。

**关键词:** [边坡工程](#) [安全监测](#) [空间数据场](#) [三维可视化](#) [体绘制](#)

**Abstract:** Achieving three-dimensional(3D) real-time dynamic visualization of spatial monitoring data field is the key of safety monitoring online visualization analysis in the slope engineering. 3D nephogram is the most direct expression of the spatial monitoring data visualization. The drawing methods of 3D nephogram include surface rendering and volume rendering, and volume rendering is the preferred method to realize the drawing of 3D real-time dynamic nephogram of the spatial data field. According to the flexible scene interaction and rich nodes for modeling, through generating the tetrahedral network(TEN) geometric model for showing the 3D nephogram of monitoring data field, on the basis of the extracting coordinates of monitoring points and forming the monitoring data field, applying the algorithm of spatial interpolation to achieve the value of monitoring physical quantity in the TEN nodes, and mapping the specific color in specific color domain value to grid nodes, finally, the method of X3D-based 3D nephogram of spatial monitoring data visualization with volume rendering is proposed. Taking the slope of a hydropower station and some accumulation body for example, the 3D nephogram of spatial monitoring data real-time dynamic visualization in the slope engineering is realized, and the deformation trend and potential deformation failure mode of monitoring object is revealed. These may provide reference for the application of this method to the slope and underground safety monitoring fields in hydroelectric engineering and geotechnical engineering.

**Keywords:** [slope engineering](#) [safety monitoring](#) [spatial data field](#) [three-dimensional visualization](#) [volume rendering](#)

Received 2012-04-19;

引用本文:

孟永东<sup>1</sup>, 蔡征龙<sup>1</sup>, 徐卫亚<sup>2</sup>, 田 斌<sup>1</sup>, 周建军<sup>1</sup>. 边坡工程中监测数据场三维云图实时动态可视化方法[J]. 岩石力学与工程学报, 2012, V31(s2): 3482-3490MENG Yongdong<sup>1</sup>, CAI Zhenglong<sup>1</sup>, XU Weiya<sup>2</sup>, TIAN Bin<sup>1</sup>, ZHOU Jianjun<sup>1</sup>. A METHOD FOR THREE-DIMENSIONAL NEPHOGRAM REAL-TIME DYNAMIC VISUALIZATION OF SAFETY MONITORING DATA FIELD IN SLOPE ENGINEERING[J], 2012, V31(s2): 3482-3490

## Service

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [Email Alert](#)
- ▶ [RSS](#)

作者相关文章