

岩土工程数字照相量测软件系统研发与应用

李元海1, 靖洪文1, 曾庆有2

(1. 中国矿业大学 建筑工程学院, 江苏 徐州 221008; 2. 福建省交通规划设计院, 福建 福州 350004)

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摘要 为便于数字照相变形量测(DPDM)技术在岩土工程中的应用与推广, 研究开发一套完整的数字图像分析与结果可视化后处理软件包。首先, 根据观测目标上是否使用人工量测标志点, 将DPDM分为两大类: 标点法和无标点法, 针对岩土类材料局部化变形特性, 提出旋转加平动的图像相关分析三步搜索算法; 然后说明基于等参四边形单元的坐标转换与变形解释方法, 并介绍DPDM软件包的主要功能, 讨论图像采集、量测精度、适用范围等应用关键问题。软件系统可为砂土、黏土、钢筋混凝土、岩石等岩土工程常用材料的数字照相变形全程观测、演化过程以及局部化分析提供有力支持。最后, 给出一个应用实例——侧向受荷桩模型试验。

关键词 [岩土工程](#); [数字照相](#); [变形量测](#); [模型试验](#); [数字散斑](#); [图像分析](#); [软件](#)

分类号

DEVELOPMENT AND APPLICATION OF DIGITAL PHOTOGRAMMETRY SOFTWARE PACKAGE FOR GEOTECHNICAL ENGINEERING

LI Yuanhai1, JING Hongwen1, ZENG Qingyou2

(1. School of Architecture and Civil Engineering, China University of Mining and Technology, Xuzhou, Jiangsu 221008, China; 2. Fujian Communication Planning and Design Institute, Fuzhou, Fujian 350004, China)

Abstract

The digital photogrammetry for deformation measurement (DPDM) in geotechnical engineering is presented together with a software package developed by the authors. First, DPDM is classified as two types according to target markers or not on the observed object. Three-step image correlation analysis algorithms were proposed specially for the geotechnical material with characteristics of apparent local deformation. Second, the algorithm for image calibration and strain calculation, based on the isoparametric quadrangle method widely used in FEM, is illustrated. Meanwhile, main functions of DPDM software package are introduced, and some key points such as image collection with high resolution, measurement accuracy, and scope of application are discussed. The DPDM technique has been proven to be a powerful tool for observing the progressive and local deformation of granular soil, rock, and concrete in geotechnical engineering. Last, a case study for laterally loaded piles is presented.

Key words [geotechnical engineering](#); [digital](#)

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