岩石力学与工程学报 2006 25 (2006-S2): 3725 ISSN: 1000-6915 CN: 42-1397/O3

边坡非圆弧潜在滑动面全局优化的新方法

赵洪波1，2

(1. 绍兴文理学院 土木工程系，浙江 绍兴 312000；2. 浙江大学 岩土工程研究所，浙江 杭州 310027)

收稿日期 2005-12-12 修回日期 2006-1-25 网络版发布日期 2007-1-30 接受日期 2005-12-12

摘要 最危险潜在滑动面搜索是边坡稳定性分析中的一项关键工作，最危险滑动面的准确确定对边坡稳定性评价、设计、施工等均具有重要意义，随着计算机技术的发展，各种最优化方法在最危险滑动面搜索中得到广泛应用。Leapfrog算法是一种优秀的全局优化方法，该方法模拟分子在空间中运动的物理现象，以分子势能表示目标函数，通过一定策略追踪分子的运动轨迹，获得问题解。极限平衡分析是工程界普遍接受的稳定性分析方法，以安全系数(滑动面的函数)为目标函数，将Leapfrog算法与Spencer法结合，提出确定任意形状滑动面的新方法，并通过2个经典算例说明该方法的可行性。

关键词 工程地质；边坡稳定性分析；最危险滑动面；全局优化；Leapfrog算法

分类号

A NEW GLOBAL OPTIMIZATION METHOD OF NON-CIRCULAR SLIP SURFACE FOR SLOPE STABILITY ANALYSIS

ZHAO Hongbo1，2

(1. Department of Civil Engineering，Shaoxing University，Shaoxing，Zhejiang 312000，China；
2. Institute of Geotechnical Engineering，Zhejiang University，Hangzhou，Zhejiang 310027，China)

Abstract

Searching for critical slip surface is the key work of analysis of slope stability，and is important for design，construction and stability evaluation. With the development of computer technology，all kinds of optimization technologies are applied to search critical slip surface. Leapfrog algorithm is an excellent global optimization method. The optimization problem is consideration of the analogous physical problem of the motion of a particle in a conservative force field，where the potential energy of the particle is represented by the goal function. Some interfering strategies are adopted to monitor the trajectory of the particle，and then to solve the problem. Slope stability is usually analyzed using limit equilibrium methods. A new methods combined Leapfrog algorithm and Spencer method is proposed to search for the arbitrary shape slip surface. The performance of the proposed method is tested and verified through the classical examples.

Key words engineering geology；slope stability analysis；critical slip surface；global

optimization；Leapfrog algorithm

DOI:

通讯作者