

坡面形态对边坡稳定性影响的理论与试验研究

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THEORETICAL AND EXPERIMENTAL STUDY OF EFFECT OF SLOPE TOPOGRAPHY ON SLOPE STABILITY

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摘要

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摘要 从失稳边坡资料统计分析、模型试验和理论计算3个方面,研究坡面形态对边坡稳定的影响(坡面形态效应)。通过对300组边坡资料的统计分析,从宏观认识上得到凸坡的稳定性较差,而凹坡稳定性较好的初步结论。采用底抬升模型试验,研究凸坡和凹坡的极限稳定角,结果表明,凹坡的极限稳定角要比平坡的大,凸坡则比平坡小。并从理论上分析凸坡、平坡和凹坡之差异,对凹坡比凸坡更稳定的现象进行解释。采用严格极限平衡法,获得圆形凸坡和凹坡的安全系数解答,分析坡面形态效应因素和变化规律,从工程应用角度制作圆形坡面形态边坡安全系数速查曲线,并建议考虑坡面形态效应的范围。研究成果可准确评价不同坡面形态的边坡稳定性提供参考。

关键词: [边坡工程](#) [坡面形态](#) [模型试验](#) [极限平衡](#) [统计分析](#) [安全系数](#)

Abstract: The effect of slope topography on the stability is studied by statistical analysis, experimental and theoretical calculation. Firstly, a preliminary result that the stability of concave slope is better than convex slope is obtained based on the statistical analysis of 300 sets of failure slope data. Then, the ultimate stable angles of concave slope, convex slope and horizontal slope are researched by tilting the model bottom. The results indicate that the ultimate stable angle of concave slope is higher than that of horizontal slope, and the convex slope's ultimate stable angle is lower than the horizontal slope's one. Thereafter, the force differences among convex slope, concave slope and horizontal slope are analyzed theoretically; and the phenomenon that the concave slope is more stable than the convex slope is explained. Finally, the safety factor of circular concave and convex slopes are derived employing rigorous limit equilibrium method. The influencing factors and changing rules of slope topography effect are also analyzed. The safety factor curves of circular slopes with different curvatures are designed to facilitate engineering applications. Then, the ranges of considering slope topography effect are also suggested. The results provide some scientific references to accurately evaluate slope stability of diverse topography.

Keywords: [slope engineering](#) [slope topography](#) [model test](#) [limit equilibrium](#) [statistical analysis](#) [safety factor](#)

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