

报告题目: 基于圆孔扩张理论应变软化岩体中嵌岩桩端承载力的估算方法
报告人: 刘耕云, 陈有亮
报告人单位: 同济大学土木工程学院地下系; 上海理工大学土木工程系, 上海

摘要: 提出了一种采用圆孔扩张法估算应变软化岩体中嵌岩桩桩端承载力的解析方法。假设施加在桩尖上的压力等于用于扩张空腔的极限压力, 将问题转化为确定极限扩张压力。结合实验室模型试验总结了两种不同的失效模式, 并根据圆孔扩张理论进行解释。此外, 还讨论了该方案的有效性和工程潜力。最后, 提出了一个快速评估应变软化岩体中嵌岩桩端部承载力的简化公式。结果表明, 在高质量 (地质强度指数 ($GSI > 60$)) 和平均质量 ($30 < GSI < 60$) 岩体的极限承载力分析中, 不同的破坏模式表现出了明显的差异甚至相反的效果。荷载-沉降曲线的解答可用于估算给定沉降水平下的应变软化岩体中嵌岩桩的承载力。

Approach for Estimating End-Bearing Capacity of Rock-Socketed Piles in Strain-Softening Hoek–Brown Rock Mass

LIU Geng Yun

Department of Geotechnical Engineering, College of Civil Engineering, Tongji University, Shanghai, P. R. China

CHEN You Liang

Department of Civil Engineering, The University of Shanghai for Science and Technology, Shanghai, P. R. China

Abstract: This study proposes an analytical solution for estimating the end-bearing capacity of piles embedded in strain-softening plastic Hoek – Brown rock masses by employing the cavity expansion method. Assuming that the pressure imposed on the pile tip is equivalent to the limiting pressure used to expand the cavity, the problem is translated into the determination of the limiting expansion pressure. Two different failure modes are summarized according to the laboratory model tests and explained based on the cavity expansion theory. Moreover, the validity and engineering potential of the presented solution are discussed. The results indicate that the two different modes display noticeable differences or even opposite effects in the analysis of the ultimate bearing capacities in rock masses with high quality (geological strength index ($GSI > 60$)) and average quality ($30 < GSI < 60$). The load–settlement curves obtained by the presented solution are compared with the experimental results. It is proven that the solution can be applied to estimate the end-bearing resistance for a given settlement level. Finally, a simplified formula is suggested to quickly evaluate the end-bearing capacity of rock-socketed piles in a strain-softening rock mass.