

隧道开挖过程中地层变形的统计分析

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摘要 以70余座浅埋暗挖法修建的隧道的实测数据为基础, 对影响地层变形的各种因素进行统计分析, 提出浅埋暗挖隧道的最大沉降量计算公式。同时还得到几点地层变形规律, 如: 最大地表沉降和拱顶下沉值的概率分布近似成正态分布; 随着围岩稳定性由好变坏, 地表沉降和拱顶下沉值也呈逐渐增大的趋势; 隧道跨度为5~10 m时, II, III, V类围岩条件下的最大地表沉降值与上覆土层厚度关系呈凸形状, II, III类围岩的最大拱顶沉降值在埋深25 m范围内随隧道埋深增大而增大; 拱顶沉降与地表沉降比值多为0.5~1.5; 在埋深小于20 m范围内, 沉降槽宽度多为(8~12)R(R为等效半径)。最后对50余座产生塌方隧道的坍塌高度和塌方量进行统计, 并对影响隧道塌方的主要因素进行分析。该研究成果为隧道进一步的设计、施工提供科学的参考依据, 具有重要的实用价值。

关键词 [隧道工程](#); [浅埋暗挖法](#); [地表沉降](#); [拱顶下沉](#); [塌方](#); [统计分析](#)

分类号

STATISTIC ANALYSIS OF STRATUM DEFORMATION DURING TUNNEL EXCAVATION

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Abstract

Based on the observed data of more than 70 shallow-depth-excavation tunnels, the formula for the maximum settlement of shallow-depth-excavation tunnel is deduced by analyzing all kinds of factors affecting stratum deformation. In addition, the law of stratum deformation is summarized. For example, the probability distributions of the maximum ground subsidence and the vault settlement appear to be approximately normal ones. With the decline of the stability of surrounding rock, the ground subsidence and the vault settlement increase gradually. When the tunnel span is between 5 and 10 m, the relationship between the maximum ground subsidence and the tunnel depth display convex shape with the surrounding rock of classes II, III, V. When the tunnel depth is less than 25 m, the maximum vault settlement increases with the rise of depth for tunnel with surrounding rock of classes II, III. The ratios of the vault settlement to the ground settlement are in the range of 0.5-1.5. When the depth of the tunnel is less than 20 m, the widths of the settlement trough are between 8R and 12R(R is equivalent radius). Finally, the collapse height, collapse amount are analyzed for more than 50 collapse tunnels. Furthermore, the main influential factors are discussed. The research results are of great importance and practical value to the design and construction of tunnel.

Key words [tunneling engineering](#); [shallow-depth-excavation method](#); [ground subsidence](#); [vault settlement](#); [collapse](#); [statistic analysis](#)

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