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半无限空间隧道应力与位移的解析延拓法求解(PDF)分

Title: A Complex Variable Solution for a Lined Tunnel with Arbitrarily Shaped Section

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摘要：   为快速得到单孔深埋任意形状隧道开挖产生的应力值与位移值,利用复变函数解法中的解析延拓法求解.由于是深埋隧道,假设隧道埋深与隧径相比比较大而不考虑重力梯度影响,直接把重力作用化为无限远处作用有外载,同时考虑隧道衬砌的支撑作用,利用复变函数的保角变换功能及解析延拓法,求出了在弹性半无限空间中,单孔任意形状隧洞外任意一点的应力值和位移值的解析解表达式.以圆形隧道作为特例,求出隧道围岩任意一点处的应力值和位移值解析解的显式表达式,该解与已有的解答一致,表明新方法的准确性.该求解方法拓展了解析延拓法的应用,且可考虑隧道的任意形状及法向支撑力,结合MATALAB工具,可为工程快速求解开挖应力及稳定变形分析提供便捷的方法

Abstract: To quickly obtain the stress value and displacement value generated by single-hole deep-burying arbitrarily shape tunnel excavation, utilize analytical continuation method in complex variables for resolution. Given it is deep-burying tunnel, and assuming the depth of tunnel is comparatively larger than tunnel diameter, and regardless of the influence of gravity gradient, directly transform the action of gravity to action at infinite far end with external applied load. At the same time, taking into consideration the supporting role of tunnel lining, utilize complex variables conformal mapping function and analytical continuation method, to get the analytical solution expression of stress value and

displacement value of any point outside single-hole arbitrarily shape tunnel in elastic semi-infinite space. Take circular tunnel as a special case, get the analytical solution expression of stress value and displacement value of any point at tunnel surrounding rock. The resolution is consistent with existing resolution. Therefore, the new method is accurate. The calculation method of this paper extends the applications of analytical continuation method, takes into account of the arbitrary shape and support of the tunnel, combines matalab tool, and can offer convenient way for project fast resolution for excavation stress and stable deformation analysis.

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