

论文

软土地区定向钻工后地表沉降的机理分析

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摘要:

基于SMP强度准则, 采用弹脆塑性软化模型, 分析了定向钻工后孔壁周围土体内的二次应力、应变场以及塑性区半径分布规律, 推导出了最优缩孔泥浆压力和允许的最小泥浆压力的计算公式; 对比基于M-C强度准则计算结果, 可得考虑中间主应力影响的SMP强度准则计算结果更精确, 能够更好地解释软土地区定向钻工后地表沉降机理并指导工程实践。同时通过改变内摩擦角、黏聚力及剪胀参数的大小, 得到土体屈服后内摩擦角和黏聚力跌落越多, 塑性区半径越大以及土的剪胀特性有助于抵抗缩孔。

关键词: 工后地表沉降; SMP强度准则; 弹脆塑性软化模型; 剪胀特性

The analytical solutions of post construction settlement and its application in the directional drilling engineering

Abstract:

The post construction ground settlement is the key factor for the project quality in the directional drilling engineering, the formula of the post construction ground settlement is the main problem to be solved. The rules of the secondary stress strain and the radius of plastic zone in soil layer with the SMP failure criterion and elastic brittle plastic soften model were analyzed, the calculation formula of the optimal mud pressure and the minimum mud pressure limited were deduced. The result computed based on the SMP is better than the result computed based on the M-C failure criterion, it can be well used to explain the mechanism of ground settlement in soft soil regions and guide engineering practice. Through changing the value of cohesion, internal friction and the dilatancy parameter, it can be found that the smaller of the cohesion and internal friction after soil yield, the greater of the radius of plastic zone, meanwhile, soil dilatancy has the function of preventing shrinkage.

Keywords: post construction ground settlement; SMP failure criterion; elastic brittle plastic soften model; dilatancy

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