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基于延缓固结法的地基工后沉降控制的数值分析

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NUMERIC ANALYSIS ON GROUND POST-CONSTRUCTION SETTLEMENT CONTROLLING BASED ON CONSOLIDATION DECELERATING METHOD

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摘要 延缓固结法(地基延缓固结处理法)是一种通过限制工程运营期间地基的孔隙压力消散来消除后期的地基固结沉降,从而达到控制地基工后沉降目的的新型地基处理方法。通过设置深层水平防渗层完善了延缓固结法,并以此为基础完成该文的研究工作。有限元模拟计算表明,延缓固结法处理的地基工后沉降随帷幕的深度增加而减小,但是当帷幕达到一定深度以后,再增加帷幕的深度,工后沉降不再减小,而竖向防渗帷幕的深度非常小时,延缓固结法反而会使地基工后沉降加大。采用有限元方法比较了分别采用延缓固结法和刚性桩处理地基的超孔压分布、竖向位移场的分布、沉降时程曲线和控制地基工后沉降的效果,且粗略地比较了二者的经济性能。在竖向防渗帷幕的深度适宜的情况下,延缓固结法控制地基工后沉降的作用确实存在。当处理深度在一定范围之内时,延缓固结法和刚性桩相比具有经济和技术双重优势。

关键词: 岩土工程 地基处理 有限单元法 工后沉降控制 地基延缓固结处理法 刚性桩

Abstract: CDM (Consolidation decelerating ground treatment method) is a new ground treatment method which eliminates later ground consolidation settlement and controls the post-construction settlement by confining the pore pressure dissipation of the ground during the operation service period. CDM is refined by setting a deep horizontal anti-seepage layer and the research is based on it. Finite element method calculation shows that the post-construction settlement of ground treated by CDM decreases with the increase of depth of anti-seepage curtain, but no more decrease will occur when anti-seepage curtain is deep enough, while CDM with very shallow anti-seepage curtain results in larger ground post-construction settlement than natural ground. Comparisons of excess pore pressure distribution, vertical displacement field distribution, settlement time process curves and ground post-construction settlement controlling effect between a rigid pile and CDM are made by the finite element method, also, economy of the two methods is compared simply. CDM does can reduce ground post-construction settlement with a feasible depth of the anti-seepage curtain. CDM is better than the rigid pile on economy and technology with the treatment depth within a certain limit.

Key words: geotechnical engineering ground treatment finite element method post-construction settlement controlling consolidation decelerating ground treatment method rigid pile

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