

疏浚淤泥固化土的压缩特性与结构屈服应力

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COMPRESSION PROPERTIES AND STRUCTURE YIELD STRESS FOR SOLIDIFIED SOIL COMPOSING OF DREDGED CLAYS

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摘要 河道疏浚拓宽以及港口新建扩建等不可避免地产生大量疏浚淤泥,如何处置大量废弃淤泥是工程界关注的一个重要研究课题。固化方法是目前处理疏浚淤泥的常用方法,其目的是将废弃淤泥处理成土工材料加以利用。处理后的淤泥固化土作为工程建设用土必须考虑其工程力学性能。为了研究疏浚淤泥固化土的压缩性状与结构屈服应力,进行了多组不同配比下淤泥固化土的压缩试验。通过室内一维压缩试验,研究了高含水率疏浚淤泥固化土的压缩性状,探讨了固化材料掺量、初始含水率、龄期等对固化土压缩变形特性和结构屈服应力的影响。压缩试验结果表明:与许多天然沉积结构性土及水泥土类似,疏浚淤泥固化土的压缩曲线均存在一个明显的结构屈服点。当上部荷载小于结构屈服应力之前,固化土的压缩性很小;一旦上部荷载超过结构屈服应力之后,固化土的压缩性急剧增大。分析了淤泥固化土结构屈服应力的影响因素,并将由一维压缩试验得到的结构屈服应力(P_y)与由无侧限抗压试验确定的抗压强度(q_u)进行了比较,给出了两者之间的定量关系。疏浚淤泥固化土在屈服前后的压缩性状差异很大,这一研究成果对工程应用很有指导意义,当上部荷载较低时,可以充分利用其屈服前的低压缩性,但应确保上部荷载不能超出其结构屈服应力,以避免固化土在缺乏预兆的情况下发生突然破坏。

关键词: 疏浚淤泥 固化土 压缩试验 压缩性状 结构屈服应力

Abstract: Huge amounts of dredged clays are inevitably produced during the processes of river dredging and widening and port construction and expanding. Consequently, how to deal with the great amounts of dredged clays has become a hot issue in hydraulic engineering and geotechnical engineering. It is usual to treat the dredged clays with solidification method. The treated soils are usually used for engineering construction. So its mechanical properties should be considered as engineering materials. In order to study the compression properties and the structure yield stress, a series of compression tests with different mixing proportions are performed on the soils. As many natural sedimentary structural clays and cement-stabilized soil, there is a notable structure yield point for all compression curves of the solidified soil in many one-dimensional compression experiment results. When the upper load is less than the structure yield stress, the compressibility of solidified soil is very small. But the compressibility increases dramatically once the upper load is over the structure yield stress. Some factors affecting the structure yield stress are analyzed. Expression about the relationship between P_y and q_u is proposed by comparing the results of the one-dimensional compression tests and the unconfined compression tests. Compression properties of the solidified soil are significantly different between pre-yield and post-yield states, which is very useful for its application in engineering. The upper load cannot exceed the structure yield stress to avoid the sudden destruction without warning.

Key words: Dredged clays Solidified soil Compression tests Compression properties Structure yield stress

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