

麥寮砂正常化應力應變行為研究

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中文摘要

根據過去學者對台灣西南沿海粉土細砂之一的麥寮砂 (MLS) 研究，麥寮砂有部分類黏土行為以及部分類砂土行為，本文針對此議題進行研究，探討麥寮砂因細料含量、過壓密比 (OCR)、試體製作方式改變而產生類黏土與類砂土行為之變化。首先，本文以適用於黏土之 SHANSEP (Stress History and Normalized Soil Engineering Property) 理論討論麥寮砂應力應變之類黏土特性，在相同過壓密條件、不同有效圍壓下之麥寮砂靜態三軸試驗中，將試驗所得之軸差應力、超額孔隙水壓除以有效圍壓，此步驟稱為正常化處理。在麥寮砂軸差應力與超額孔隙水壓經過正常化處理後，發現麥寮砂正常化行為有類似黏土正常化之重合關係。另外，本文以砂土之臨界狀態來探討麥寮砂之類砂土特性，所謂臨界狀態是砂土進行不排水剪力試驗時軸差應力與孔隙水壓趨於穩定而應變卻持續增加的狀況，從麥寮砂不同細料含量、不同過壓密比試驗中所繪製出的臨界狀態曲線 (CSL) 發現，該曲線隨著細料含量增加而有降低的趨勢，試體之過壓密比僅會影響試體之緊密程度，並不會影響臨界狀態曲線。

關鍵字：麥寮砂 (MLS)、SHANSEP、過壓密比 (OCR)、臨界狀態 (CS)、臨界狀態曲線 (CSL)

On normalized stress-strain behavior of Mai-Liao Sand

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Abstract

Research has indicated that the behavior of Mai-Liao Sand (MLS), a typical silty fine sand from South Western Taiwan, can have different degrees of clay-like and sand-like behavior. Concentrating on this issue, this research studies the effects of fines content, overconsolidation ratio (OCR), specimen preparation method on the clay-like and sand-like behavior of MLS. The clay-like behavior of MLS was evaluated under the SHANSEP (Stress History and Normalized Soil Engineering Property) framework originally developed for clays. A series of triaxial monotonic compression tests were performed on MLS specimens with OCR and confining stress. The stress-strain and excess-pore-water-pressure-strain relationship were divided or normalized by its final confining stress. Results showed that MLS did show as in the case of clays, the normalized stress-strain or pore-pressure-strain curves tend to merge together. The sand-like behavior was evaluated using the critical state concept. The critical state is defined as a state in undrained triaxial test, the deviator stress and excess pore water pressure remains more or less constant, as the axial strain continues to increase. The critical state lines (CLS) were determined for MLS specimens with different fines content and OCR. Results showed that fines content causes the CSL to move downwards. OCR has no apparent effect on the characteristics of the CSL.

Keywords : Mai Liao Sand (MLS) 、 SHANSEP 、 Over Consolidation Ratio (OCR) 、 Critical State (CS) 、 Critical State Line (CSL)