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Mechanical behaviour of biocemented sand in triaxial consolidated undrained and constant shear drained conditions

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ABSTRACT

Biocement, or microbially induced calcite precipitation (MICP), is a sustainable soil improvement method. The biocement method can bind soil particles and fill soil pores by calcite precipitation, and in turn significantly enhance the mechanical properties of soils. In this paper, triaxial consolidated undrained (CU) tests and constant shear drained (CSD) tests were carried out on sands (Ottawa sand, ASTM Graded) with various biocement treatment passes and original relative densities. In the triaxial CU tests, it is found that the biocemented sands have more dilative behaviour by showing a higher stress-strain curves and faster pore pressure reducing trends, as compared with their untreated counterparts. For the biocemented sands, the stress ratio *q*/*p*' versus axial strain curves show peak values at relatively low axial strains and gradually decrease thereafter, which could be due to the mobilization and degradation of biocementation in soils. Subject to CSD stress paths, biocemented sands start to lose stability at a higher *q*/*p*' stress ratio than untreated sands, implying that the biocement method could be effective in enhancing the stability of soil slopes under pore pressure increase or mean effective stress decrease conditions.

1. INTRODUCTION

Microorganisms and their activities in soil ecosystems can affect the evolution, physical and mechanical properties of soils. These microbial activities can be controlled and utilized to tackle several geotechnical problems. The adoption of microbial methods in geotechnical engineering has gaining increasing research attention in the last

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