

Localized compressive strength profiling of sand column treated with MICP using surface percolation method

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ABSTRACT

The applications of microbially induced carbonate precipitation (MICP) for biocementation in soils under various biogeochemical conditions are increasing rapidly. The improvement in the geotechnical properties of MICP treated soils, within the effective area of treatment, vary with the transportation, retention, and cementation mechanisms associated with MICP treatment methods. Despite the use of conventional approaches for strength measurement of MICP treated soils being reported widely, the effect on localized strength pattern in soils through biocementation is yet overlooked. Based on a series of sand column tests in this study, the localized strength profiling caused by urease activity of *Sporosarcina pasteurii* in unsaturated sand is carried out. The MICP treatment under different conditions was conducted using 10 cm in height and 5 cm in diameter sand columns through surface percolation method. The local strength of MICP-treated sands was profiled along the height by unconfined compressive strength (UCS) determined by measurement of needle penetrometer index (NPI). Moreover, the precipitated CaCO_3 content as well as the gravimetric water content were quantified in each segment of the sand columns according to time. The results were used to investigate the dependence of localized strength on the precipitated CaCO_3 and gravimetric water content with time. This study not only introduces the localized compressive strength measurement of MICP treated sands but it is also a useful contribution towards optimization and efficient application of MICP technology for soil improvement.

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