

عنوان مقاله:

Use of iron-based biogeotechnologies for soil improvement

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خلاصه مقاله:

In geotechnical engineering, conventional soil improvement techniques – including both mechanical and chemical stabilization methods – have potential drawbacks such as high cost, high energy consumption and sometimes negative environmental influences. However, the rapid development of biotechnology has provided opportunities for innovation in soil improvement methods. In recent years, a promising approach, the so-called microbial geotechnology, has been attempted. This study contributes to the development of biocement and its application to soil improvement. A new variation of biocement through the microbially induced iron salts precipitation was also studied. The iron-based biocement consists of UPB, ferrous and urea solution and the iron is produced by microbial activity through a reduction process. Experiments with ferrous cations provided by chemical reagents were also studied. The data on the sand biocemented with iron-based biocement have shown a reduction in the hydraulic conductivity of the sand from 10^{-4} m/s to 10^{-7} m/s. There is also an increase in the unconfined compressive strength (UCS) of 402 kPa when the precipitated iron to sand ratio is 6% (w/w). The precipitated iron hydroxide in the sand grains has been identified from the FESEM images.

کلمات کلیدی:

Iron-based, biocement, soil improvement, ferrous cations

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