

Study on anti-seepage mechanism of attapulgite-modified loess in Northwest China

ABSTRACT

Loess is distributed widely in the arid areas in northwest China. Lanzhou city is located on the loess plateau, covered by a large area of deep collapsible Malan loess. Collapsible loess is a soft soil in engineering. It has a specific bearing capacity under dry conditions but will collapse after being immersed in water, which is unfavorable to engineering construction. This paper used the attapulgite abundant in the Zhangye City of Gansu Province as a modifier to improve the loess. The permeability test tested the permeability coefficient of the specimens under different dosages of attapulgite. The anti-permeability principle of attapulgite-modified loess was analyzed from the microscopic perspective by electron microscopy scanning (EMS) and nuclear magnetic resonance (NMR). The test results show that the permeability coefficient of attapulgite-modified loess decreases significantly compared with pure loess, but the permeability coefficient decreases gently when the content of attapulgite exceeds 10%. It was found that the anti-permeability mechanism of the modified loess was that the cohesive attapulgite particles filled the macropores of the loess particles, and the acicular attapulgite combined the loess particles to form a sheet structure, which reduced the porosity and permeability of the modified soil.