

## Research of Seepage Field and Slope Stability Considering Heterogeneous Characteristics of Waste Piles: A Less Costly Way to Reduce High Leachate Levels and Avoid Accidents

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**Abstract :** Due to the characteristics of high-heap and large-volume, the complex layers of waste and the high-water level of leachate, environmental pollution, and slope instability are easily produced. It is therefore of great significance to research the heterogeneous seepage field and stability of landfills. This paper focuses on the heterogeneous characteristics of the landfill piles and analyzes the seepage field and slope stability of the landfill using statistical and numerical analysis methods. The calculated results are compared with the field measurement and literature research data to verify the reliability of the model, which may provide the basis for the design, safe, and eco-friendly operation of the landfill. The main innovations are as follows: (1) The saturated-unsaturated seepage equation of heterogeneous soil is derived theoretically. The heterogeneous landfill is regarded as composed of infinite layers of homogeneous waste, and a method for establishing the heterogeneous seepage model is proposed. Then the formation law of the stagnant water level of heterogeneous landfills is studied. It is found that the maximum stagnant water level of landfills is higher when considering the heterogeneous seepage characteristics, which harms the stability of landfills. (2) Considering the heterogeneity weight and strength characteristics of waste, a method of establishing a heterogeneous stability model is proposed, and it is extended to the three-dimensional stability study. It is found that the distribution of heterogeneous characteristics has a great influence on the stability of landfill slope. During the operation and management of the landfill, the reservoir bank should also be considered while considering the capacity of the landfill.

**Keywords :** heterogeneous characteristics, leachate levels, saturated-unsaturated seepage, seepage field, slope stability

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