

动、静荷载作用下细粒土的冻胀特性实验研究

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Experimental study on frost action of fine-grained soils under dynamic and static loads

摘要

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摘要 随着列车速度的不断提高, 季节冻土区路基工程的冻胀问题也越来越突出。为研究细颗粒土在动荷载作用下的冻胀特性, 进行了无荷载、静荷载和动荷载条件下室内开敞系统的冻胀实验, 对比分析了无荷载、静荷载和动荷载条件下细粒土的冻胀变形、水分迁移速率及土中含水量的分布。实验结果表明: 静荷载、列车动荷载对土的冻胀都具有一定的抑制作用, 随着外荷载值的增大, 该细颗粒土的冻胀率逐渐减小; 且当静荷载值等于动荷载幅值的二分之一时, 动、静荷载对细颗粒土冻胀的影响基本相同; 土冻结过程中水分迁移速率随着冷却温度的降低而逐渐增大, 而随列车动荷载值的增大而相应降低; 土的冻胀特性基本不受列车动荷载频率变化的影响。

关键词: 动荷载 冻胀 水分迁移

Abstract: With the increase of train speed, the frost hazard of subgrade engineering in seasonally frozen soil becomes more and more serious. In order to research frost heaving characteristics of fine-grained soil subjected to dynamic loading, the frost heaving tests are performed. Based on the results of laboratory experiments on open frost heave for fine-grained soils, the influences of no load, static load and dynamic load on frost heave susceptibility are discussed comparatively. The test results show that the frost of soils is restrained respectively by the static loading and the dynamic load of a train. The frost heaving ratio of fine-grained soil gradually tends to reduce with the increase of external load, and when the static load is equal to half of the dynamic load, the characteristics of frost heave of fine-grained soils under static load and dynamic load respectively are approximately equal. The moisture inflow velocity of freezing soil increases with the decrease of cooling temperature, and decreases with the increase of the dynamic load, The frost heave of soils is not affected by the change of cyclic loading frequency of the train.

Keywords: dynamic load frost heave moisture migration

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