

一个冻土水盐热运动的数学模型

A MATHEMATICAL MODEL OF HEAT-WATER-SALT MOVEMENT IN UNSATURATED FROZEN SOILS

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中文摘要：

本文建立了一个冻土水盐热运动的数学模型。为了考虑土壤冻结和化冻时冰—液相变的影响,在传统土壤热传导方程中加入了溶化潜热运动项和存传统土壤水分运动方程中加入了相变项,从而推导出了三个相互关联的冻土水盐热运动方程,并提出了描述冻土未冻水含量随土壤冻结温度而变化的土壤冻结特征曲线及其实验测定方法。这个模型既可适应于冻土,也可适应于未冻土。

英文摘要：

A mathematical model was developed to describe the heat-water-salt movement in unsaturated frozen soils, The flow of the fusion latent heat was incorporated into the sensible heat flow equation and the mass transport induced by the phase change was incorporated into the liquid flow equation to account for the phase transformation, and by this way, the three inter-dependant partial differential equations for the heat-water-salt movement in unsaturated frozen soils were established A so called "soil freezing characteristic curve", which describes the dependance of liquid content on the freezing temperature, was also established and determined in this study. The model developed can be applied for heat-water-salt movement both in frozen and unfrozen unsaturated soils.

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