



The effect of plant root system on temperature and moisture of road cutting slope in seasonal frozen regions

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In recent years, in the seasonal frozen regions of Northeast China, the construction of highway improved enormously people's journey condition, but also brought a series of environmental question. In order to meet the route requirement, it is inevitable to excavate the mountain slope, which damage the surface vegetation and cut off the runoff passage of groundwater, cause the outcrop of underground water on the cutting slope and affect the intrinsic ground stress equilibrium of the slope body, lead to the redistribution of ground stress and the heat balance change in near-surface of the cutting slope. Under influence of rainfall in autumn and the cold climate in winter, the moisture transfer to frozen zone of cutting slope and lead to the frost heave in shallow depth of the slope. During the thawing period in spring, with effect of integrated factors including rainfall and increasing temperature, ice kernels both on the surface and near the surface of cut slope thaw quickly. The water melting from frozen soil, will hampered by frozen layer in process of infiltration. As a result, the water content of the intersection between the freezing and melting layer is high enough to be saturation or even over-saturation, and accordingly cause the intrinsic effective stress on the slope body decreased. Under the function of gravity, near-surface slope collapses partially or entirely. As experience of highway construction accumulated, and the consciousness of environmental protection strengthen, the efficiency and the rationality of plant protection slope was realized gradually, slope protection method has transited gradually from masonry body to combined with plant protection, or complete plant protection. Adopted the method combined field test and lab test, this article analyzed the effect of plant system on the temperature and moisture of soil body, especially the root-soil system in freezing process. The results showed that compared with non plant, the soil body protected by plant had lower moisture content and freeze slowly, which indicated the plant could made the condition of moisture and temperature in the slope better, then reduced the destruction of freezing and thawing to the road slope. The study result could provide theory support for the design of plant protection in the slope of seasonal frozen regions.

Key words: road slope, season frozen regions, plant protection, temperature, moisture