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Dynamic response analysis of highway slope under traffic vibration in Tibet -Qinghai frozen ground zone

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Slope failure in Tibet-Qinghai frozen ground zone is a severe geological disaster for highway safety. In recent years, land utilization in Tibet-Qinghai frozen zone is fast, climate-change, engineering activities and other human activities have induced a vast number of landslides and debris flow because of unreliable frozen development and little protection. In order to evaluate the traffic vibration effect to frozen slope failure, the paper presents a dynamic response analysis of the mechanism of slope failure under traffic vibration by using numerical modeling. Herein, the traffic dynamic load is simulated as moving stochastic process, which is the function of traffic velocity, pavement surface uneven coefficient; the site is respectively treated as a symmetrical site in frozen season and a two-layer stratum in thawing season. Based on experiments and using seismic wave progression theory in earthquake engineering, the relationships between slope stability and frozen soil dynamic parameters (dynamic stress-strain property, dynamic modulus and dynamic damping ratio, pore water pressure) under traffic vibration are studied, some valuable conclusion have been got. As an illustration, numerical modeling analysis on the platform of ANSYS is done to simulate the dynamic failure of highway slope in frozen and thawing statue. In this model, this computing boundary is selected 200 meters in horizontal direction (100 meter in each side of highway) and 10 meter in depth according to the field observation. The results show that traffic vibration load greatly effects on slope stability in certain situations.

Key Words: Dynamic Response Analysis, Frozen Ground, Traffic Vibration Load, Numerical Modeling