Professor Jiankun Huang works in the development and implementation of multi-scale calculation method to root reinforcement and ecological disaster prevention & mitigation. He has been a faculty member of the School of Soil and Water Conservation at Beijing Forestry University since 2014.

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Three-dimensional homogenized constitutive model of root-soil composites

presented by

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ABSTRACT: The effectiveness of plant roots in soil reinforcement and landslide protection cannot be overstated, as it represents an economic and ecological approach to safeguard slopes and human activities. While researchers have recognized the significance of ecological measures in forestry for mitigating natural disasters, the mechanics and behavior of rooted soils under complex natural environments are still not fully understood. My research aims to study the mechanical properties of rooted soil and establish rigorous and accurate evaluation methods that consider root morphologies. This study regards root-soil composites as natural fiber-reinforced composites to reflect the reinforcement effect of randomly distributed roots in nature and reveals the influence of complex root distributions on the mechanical properties of root-soil composites and the mechanism of root reinforcement. The accuracy of the composite calculation method was verified by the geotechnical tests. New methods, technology, and materials allowing better predict and evaluate the slope failure mechanism will be discussed and forecasted.

KEY WORDS: Homogenization theory; root reinforcement; random distribution; geotechnical test technology.

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