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Study on the mechanism of root reinforcement based on multiscale coupling model

presented by

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ABSTRACT

Loess Plateau is one of the most serious regions with soil and water losses in China. Gravity erosion including landslides is recurrent. The effect of vegetation roots on soil reinforcement and landslide prevention cannot be ignored. Previous research on the root reinforcement focused on the influence of the single root or root bundle on the soil. However, research for accurately predicting the effects of complex root groups on slope reinforcement remains insufficient. In this presentation, I will introduce: (1) The multiscale coupling mechanical model of roots and soil via homogenization theory. (2) The influence of the factors including species, spatial layout and soil properties on the slope stability. (3) Model validation via three-axial compression tests. I tried to apply the homogenization theory in the field of material science to study the mechanical properties of the root-soil composites. I aim to establish the coupling relationships between the three different scales including the microscopic root system, mesoscopic “roots of plant individual and surrounding soil”, and macroscopic vegetated slope. The mechanism of root-group reinforcement is explained by the principle of periodic composite materials.

KEY WORDS

Soil reinforcement and slope protection; Root system; Multiscale; Slope stability

Invited and animated by:

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