STRAIN DISTRIBUTION WITHIN GEOSYNTHETIC-REINFORCED SLOPES

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Abstract: Geosynthetic-reinforced slopes are conventionally designed using methods based on limit equilibrium. In order to estimate the factor of safety against internal stability using these methods, the distribution of the reinforcement peak tensile forces with height must be assumed. A linear distribution of reinforcement peak tension with height, with zero tension at the crest and maximum peak tension at the toe of the structure, has often been assumed. Although this assumption may be appropriate for the design of vertical geosynthetic-reinforced walls, little evidence has been collected so far justifying this distribution for the design of geosynthetic-reinforced slopes. A combination of centrifuge testing and digital image analysis is undertaken in order to obtain the strain distribution within geosynthetic-reinforced slopes under prefailure conditions. Specifically, digital image analysis techniques are used to determine the displacement distribution along reinforcement layers in reduced-scale models subjected to increasing *g* levels. A sigmoid function was useful to fit raw displacement data and estimate the strain distribution along reinforcement layers. Analysis of reinforcement strain results shows that the location of the reinforcement maximum peak strain does not occur near the toe of the structure, but was located approximately at midheight of the reinforced slopes, at the point along the critical failure surface directly below the crest of the slope. The pattern of reinforcement peak strain with height obtained for prefailure conditions is similar to that obtained for failure conditions. The estimated factor of safety is found to be a good indicator of the magnitude of the reinforcement maximum peak strain for geosynthetic-reinforced slopes built with different configurations.

Full reference:

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