LIMIT EQUILIBRIUM AS BASIS FOR DESIGN OF GEOSYNTHETIC REINFORCED SLOPES

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Abstract: Limit equilibrium methods are evaluated with respect to their ability to predict failure of geosynthetic reinforced slope models tested in a geotechnical centrifuge. The variables considered in the centrifuge testing program were the reinforcement spacing, reinforcement tensile strength, and soil shear strength. Extensive testing was initially conducted to evaluate the strength properties under operational conditions of the backfill material, the model geotextile reinforcements, and the several interfaces in the slope models. Parametric studies were performed to evaluate the effect of the in-soil geotextile tensile strength, nonuniformity of unit weight in the centrifuge models, orientation of reinforcement forces, reinforcement overlapping layers, lateral friction of the models against centrifuge box, and selected method of slope stability analysis. All centrifuge slope models built using the same backfill soil yield a single Normalized Reinforcement Tension Summation. This normalized value can be interpreted as an earth pressure coefficient that depends on the soil friction angle and on the slope inclination. The evaluation also indicates that limit equilibrium should consider horizontal orientation of reinforcement forces, that significant contribution to stability is provided by the overlapping reinforcement layers, and that different rigorous limit equilibrium methodologies provide equally good results. Very good agreement was obtained between the *g*-levels at failure obtained experimentally and those predicted by limit equilibrium. Equally good agreement was obtained between experimental and predicted locations of the failure surfaces.

Full reference:

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