

百喜草根加勁土壤力學行為之研究

游新旺* 范書瑋

摘要 本研究將探討含百喜草根之土壤試體，在不同剪變位下根與土壤間之力學行為，同時對含根土壤剪力強度增量之兩種評估模式提出檢驗。簡易評估法 (Wu et al.,1979) 假設垂直根系在同一時間斷裂，根力模式 (Waldron and Dakessian, 1981) 則假設垂直根系在不同階段循序斷裂。研究中發現，根生長茂密之植物，只考慮垂直根系之力學行為推估土壤之剪力強度增量，可能低估側向細根對土壤加勁所增加之土壤抗剪力。對於根生長稀疏之植物，假設根同時斷裂之簡易評估法，則可能會高估植物根對土壤之抗剪能力。結果顯示，經由根力模式所計算之土壤剪力強度增量有較正確之評估值。同時亦提供了較合理的評估程序和較易了解之土根間力學行為。

關鍵詞：根力模式、加勁土壤、力學行為。

A Study of the Mechanical Behavior of Soils Reinforced by Bahia Grass Roots

Hsin-Wan Yu* Shu-Wei Fan

ABSTRACT This study examined the mechanical behavior of soils reinforced with Bahia grass roots under different shear displacements with two different models. The simple assessment method (Wu et al., 1979) assumes simultaneous breakage in vertical roots while the root strength model (Waldron and Dakessian 1981) assumes sequential breakage of vertical roots. Results indicate an underestimation of the shear strength increment of the soil among dense cluster roots when solely considering vertical roots and ignoring the contribution of lateral fine roots to soil reinforcement. On the contrary, the shear strength increment of the soil in sparse roots was overestimated with the assumption that the root's mechanical behavior is characterized by simultaneous root breakage as proposed in the simple assessment formula. Compared with the simple assessment formula, the root strength model gives a more accurate estimation of value and its procedure is more realistic for understanding the mechanics of soil-root systems.

Key Words : Root strength model, reinforced soil, mechanical behavior.

一、前言

對於邊坡產生滑移時，一般研究顯示，土根系統之根系於剪力面將產生斷裂或滑移之現象。本文將引用 Wu et al.於 1979 年提出之簡易評估法 (simple assessment method) 與游新旺等 (2009) 提出之修正根力

模式 (modified root strength model)，分別計算植物根系對土壤剪力強度增量值，並與完成之試驗結果比較。

為探索根之拉力強度，Operstein and Frydman (2000), Tosi (2006) 及 Mickovski et al. (2007) 曾對不同根系結構進行拉拔試驗，以了解根徑與根抗拉力關係及根型態與根土間握裹應力關係等。對於不同根系結