土-根系統之力學模式及試驗分析

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摘　　要　傳統上，在試驗室內或野外現地進行之根系拉拔試驗(pull-out test)或直剪試驗(direct shear test)時，試驗前之試體準備及試坑開挖整修，耗時又費力，而且試體常會受到相當之擾動或破壞。因此，本研究期望透過既有根力模式及數值分析方法，發展一套數值程序以模擬試驗室及現地各種根系力學試驗之應力及變形行為。由分析結果及實務應用之目的觀之，各類型土-根直剪試驗之數值模擬預測結果與實際試驗量測成果之吻合度相當良好。因此，本文所提之根系力學試驗數值模擬程序及根系材料參數轉換方法之有效性除了可獲得確認外，未來也可運用在植生工程含根邊坡穩定性之量化評估與分析上。

關鍵詞：土-根系統互制行為、拉拔試驗、直剪試驗、數值模擬。

Mechanical Models and Experimental Analysis of Soil-Root System

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ABSTRACT　　It is recognized that the sample preparation and test pit excavation of a pull-out test or a direct shear test of soil-root system are tedious and time consuming no matter whether they are conducted in a laboratory or in a field. Moreover, the testing specimens were frequently heavily disturbed before the testing. To cope with the aforementioned problems, this study attempts to develop a numerical procedure to simulate the stress~strain behaviors of the soil-root sample from various types of mechanical experiments using numerical tools. From the standpoint of practice, the numerical predictions are in reasonable agreement with those from the measurements and the validities of the proposed simulation procedure and the conversion techniques of root system can be verified. In addition, the various computation schemes proposed in this study have extreme potential to be used as a reference for the quantitative evaluation of the stability of vegetated slopes.

Key Words:　interaction behaviors of soil-root system, pull-out test, direct shear test, numerical simulation.

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