

非破壞檢測應用在預拌土壤材料品質檢測之研究

Quality Inspection for Ready Mixed Soil Materials by Nondestructive Testing

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摘 要

預拌土壤材料 (RMSM) 是一種介於控制性低強度材料 (CLSM) 與土壤水泥間 (Soil Cement) 之新型回填材料。本研究係以高屏河流域因莫拉克颱風造成八八風災所沖刷之河川為研究材料，分別以高屏堰及里嶺大橋上游之河川淤砂進行相關配比試驗，再利用超音波速與反彈錘法作為 RMSM 現地強度檢測方法，探討此兩種檢測方法之適用性及期望能解決臺灣自然砂石資源短缺與廢棄土方問題。研究中使用十二組添加河川淤砂與資源回收土之配比，水灰比 1.5、1.7、1.9，配比設計強度為 28 天齡期抗壓強度不超過 50 kgf/cm²，試驗齡期為 1、7、28、56 天，每個齡期於圓柱試體與版試體上進行超音波速與反彈錘試驗，建立出 RMSM 非破壞檢測與抗壓強度之關係方程式。結果顯示，RMSM 新拌性質方面十二組配比皆可滿足高流動性要求。水灰比 1.5 之 RMSM 抗壓強度成長幅度大於水灰比 1.7、1.9 者；里嶺大橋段 (L) 河川淤砂配比之強度高於高屏堰段 (H) 淤砂配比之強度。利用超音波速、反彈錘數與抗壓強度所建立之非破壞檢測關係式，具有良好相關性，抗壓強度推算誤差值分別小於 10% 與 14%。

關鍵詞：預拌土壤材料、控制性低強度材料、非破壞檢測。

Abstract

Ready-mixed soil materials (RMSM) is a new type of controlled low strength materials (CLSM) with engineering properties between CLSM and soil cement. The objective of this study is to establish the relationship between the physical quantities measured by the nondestructive techniques and the compressive strength of RMSM. The specimens used in the studies were made of silt from Kao-Ping River sediment by Typhoon Morakot. The water to cement ratio (W/C) are 1.5, 1.7 and 1.9. The design 28 days strength must be less 50 kgf/cm². The results show that the workability of RMSM can satisfy the needs of requirements. The model established by nondestructive techniques using ultrasonic pulse velocity, rebound hammer count and compressive strength, has high degree of relevancy. The compressive strength of RMSM can be predicted by the ultrasonic pulse velocity and rebound hammer with errors of less than 10% and 14% respectively.

Key words: ready-mixed soil materials, controlled low strength materials, nondestructive test.

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