橋墩自然振動頻率與沖刷深度關係

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摘　要　台灣河川坡陡流急，容易因為洪水災害而導致河道沖淤變化，使橋墩之覆土深度改變，此改變有可能會導致橋梁之損壞，因此暴雨期間的橋墩覆土深度監測有其必要性；而覆土深度變化會改變橋梁的自然振動頻率，因此本研究採用 Hong et. al. (2014) 所發展的橋墩自然頻率即時監測系統，進行橋墩覆土深度與自然頻率之試驗研究，首先於塑膠管填充混凝土以模擬橋墩，並就橋墩可能遇到之各種現象進行試驗，試驗條件包括枯水期土壤不飽和情況，洪水期間水深變化情況，並搭配不同覆土深度，推得各種條件下之自然振動頻率，未來將可應用於橋墩覆土深度之即時監測。

關鍵詞：橋墩沖刷、無線感測網路、自然振動頻率。

The Relationship between the Vibration Frequency and Soil Cover Depth for the Bridge Pier

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ABSTRACT The steep slope and short river length induces the fast flow velocity in the stream in Taiwan. Fast flow velocity will bring the erosion and decomposition in the river bed, and change the soil cover depth of bridge pier, which may damage the bridge. Therefore, the monitoring of soil cover depth is necessary for the bridge safety during the flood period. This study adopted the real-time monitoring system of vibration frequency for bridge pier developed by Hong et. al. (2014) to find the relationship between the vibration frequency and the soil cover depth. Firstly, a plastic pipe was filled with concrete to simulate the bridge pier. The experiments were then executed by the various possible conditions of bridge pier in the river. The flow conditions include the unsaturated soil during the dry season and the water depth variation during the flood period. The soil cover depth was also changed to obtain the vibration frequency of bridge pier, which can be applied in the real-time monitoring of bridge pier in the future.

Key Words : Bridge Scouring, Wireless Sensor Network, Natural Vibration Frequency..

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