

## 潛沒式導流板之形狀對交互作用現象的影響

歐陽慧濤<sup>[1]\*</sup> 賴進松<sup>[2]</sup> 林政斌<sup>[1]</sup> 羅元宏<sup>[1]</sup>

**摘 要** 潛沒式導流板為國外常見的河川治理工法，其應用範圍甚廣，諸如穩定河川岸壁、取水口泥砂排除、渠道疏濬等方面的應用皆有良好的成效。由於單一潛板的影響範圍有限，於實務應用時通常沿一河川斷面上設置一系列的潛板組成一潛板系統以增加其影響範圍。過去的研究指出潛板系統間有交互作用現象存在，各潛板彼此互相影響而造成導流效果下降，然而由於理論的限制，此方面的研究多僅針對矩形潛板進行探討，至於其他形狀的潛板系統中之交互作用現象的相關研究則較少。本文應用機翼理論中的小板法針對各種不同形狀的多潛板系統進行模擬，並結合鏡像法將水面及底床等邊界的影響以虛擬潛板系統的概念納入流場計算中，藉由分析各形潛板系統所產生的徑向流速分布，探討不同的潛板形狀對潛板系統間的交互作用現象所造成的影響。研究結果顯示潛板系統間的交互作用現象隨潛板的設置角度增大而增強，並隨設置間距的增加而減弱。潛板系統間各板的導流效果並不相同，各板效能的差異以束縮板最為明顯，前傾板次之，矩形板則最為接近。

**關鍵詞：**潛板形狀、交互作用、潛板系統、小板法、鏡像法。

## The effect of submerged vane shape on the interaction between the vanes

Huei-Tau Ouyang<sup>[1]\*</sup> Jih-Sung Lai<sup>[2]</sup> Cheng-Pin Lin<sup>[1]</sup> Yuan-Hung Luo<sup>[1]</sup>

**ABSTRACT** Submerged vane is a technique for river management with a wide range of applications such as channel bank protection, sediment exclusion for water intake, and dredging for navigational channels. Since the area affected by a single vane is limited, in applications, several vanes are usually installed in a row along a channel cross-section to widen the affected area of the vanes. Previous researchers found the vanes in a row interact with one another, thus reducing the vanes' capability in sediment management. However, due to the simplification of the theory, most of the researches on the interaction effect have so far been restricted to rectangular vanes. Few have mentioned vanes of other shapes, and even less the interaction effect of these types of vanes. The goal of this research is to study the interaction effect between vanes of various shapes by utilizing the panel method and theorem of images in aerodynamics. The results show the interaction effect increases with the angle of the vane to the flow, and decreases with the shorter distance between the vanes. The sediment management capability for each of the vanes in a row is not the same. The differences are clearest for the tapered vanes,

[1] 國立宜蘭大學土木工程學系

Department of Civil Engineering, National Ilan University, Yilan City, 260, Taiwan.

[2] 國立台灣大學水工試驗所

Hydrotech Research Institute, National Taiwan University, Taipei, 10617, Taiwan.

\*Corresponding Author. E-mail address: htouyang@niu.edu.tw