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河道植生群型態對水流之影響

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摘　　要　本研究旨在建立一水流通過植生群之水深平均二維水理模式，並探討植生群型態對水理特性之影響。模式計算求解時間（雷諾）平均及水深平均之 Navier-Stokes 方程式，並引入$k-\varepsilon$紊流模式描述流場之紊流結構，植生之影響以動量方程式中外加的阻力項考量，控制方程式以有限體積法離散，利用 SIMPLE 求解程序與非交錯網格，建立了高精度與高效率的數值模式。計算模式被應用在水流通過矩形渠道單側植生及複合渠道洪水平原植生兩個案例計算，經由文獻中渠道實驗量測之流速橫向分佈驗證，顯示本文所發展之計算模式具有良好的準確性。在針對矩形直線渠道五種不同植生群型態，包括：對照組原方案、沿河道主流側採伐、沿河道側邊採伐、交替採伐及植生密度疏伐，進行模式計算模擬後，比較討論流場之水位及流速分佈特性，結果顯示以沿河道主流側採伐，對於降低水流通過植生群之水位洩降及流速集中現象，有最顯著之降低效果。

關鍵詞：植生、水理模式、紊流。

Effect of Vegetative Shape on Hydrodynamic Behavior

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ABSTRACT　A depth-averaged two-dimensional numerical model has been developed to simulate flow in a channel with a vegetative zone. The present model solves the depth-averaged Reynolds Averaged Navier-Stokes Equation, and the turbulent effect is determined by the standard $k-\varepsilon$ turbulence model. The vegetative effect is considered by a drag force exerted by the flow on the vegetation, resulting in an extra source term include in the momentum equations. A control-volume method of based on a non-staggered grid, is applied to discretize the continuity, momentum and turbulent model equations with SIMPLE algorithm. Simulated results of flows in a rectangular and a compound channel with vegetation along one side are coincided with the previous experimental data. Furthermore, the present model is used to simulate five different vegetative scenarios, including original, cutting along the main-channel side, and bank side, alternative cutting and reducing vegetative density, in a rectangular channel. Simulated results suggest cutting along the main-channel side can effectively reduce the water levels and flow velocities around a vegetative zone.　***Key Words：*** vegetation,model, turbulence.

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