

應用集水區地形與土壤特性建立瞬時單位泥沙歷線

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摘要 當大量降雨落在坡陡流急之集水區時，常造成嚴重土壤沖蝕情形。由於泥沙的沖蝕及運移過程相當複雜，且一般流量站鮮少量測泥沙濃度，致使集水區泥沙流出量並不容易估算。本研究結合土壤沖蝕理論以及地貌瞬時單位歷線理論，並應用集水區地形與土壤特性以建立瞬時單位泥沙歷線模式，因此集水區泥沙流出量即可經由降雨及瞬時單位泥沙歷線褶合積分而得。本研究選取美國密西西比州之 Goodwin 試驗集水區資料作為模式驗證，並運用數值高程模式推求集水區地形因子，以進行後續之降雨逕流演算。研究結果顯示，模式計算所得之泥沙流出量與集水區實測紀錄甚為相近。因此在有紀錄或無紀錄集水區之水資源相關規劃工作上，應可採用本模式以計算集水區泥沙流出量。

關鍵詞：土壤沖蝕，泥沙流出量、瞬時單位泥沙歷線。

Development of instantaneous unit sedimentgraph based on watershed geomorphologic and soil characteristics

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ABSTRACT Concentrated rainstorms falling on steep hillslopes usually result in serious soil erosion. It is difficult to estimate sediment yield from watersheds because the itinerary of the eroded sediment is quite complicated and temporal sediment concentration is not easily be measured. In this study, an instantaneous unit sedimentgraph model was developed based on watershed geomorphologic and soil characteristics, in which soil erosion theory and geomorphologic instantaneous unit hydrograph theory were combined. Consequently, the sediment yield for a watershed can be estimated by convoluting the rainfall with the proposed instantaneous unit sedimentgraph. The proposed model has been verified using the data from Goodwin Experimental Watershed located in Mississippi of USA. A digital elevation model was applied to obtain the watershed geomorphologic factors for subsequent rainfall-runoff routing. The simulated and the measured sedimentgraphs were in good agreement. It is promising for the proposed model to be used for sediment yield estimation in gauged and ungauged watersheds for water resources design work.

Key Words: soil erosion, sediment yield, instantaneous unit sedimentgraph.

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