漫地流之紊流流況解析

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摘　　要　在擬具水土保持計畫以及規劃相關之工程時，首先須考量的便是山坡地地表上之水流流動情形。工程師常將地表上逕流視作漫地流來考慮，依照水土保持技術規範及手冊，假設漫地流流速介於 0.3~0.6 m/s，使得實際規劃設計時，常以主觀意識之經驗來判斷之。本研究將流場分為三個區域（均質水層、草層、可透水土層），視植被內與土壤中流動之水流為孔隙介質流，並考慮透水地表之流速不為零，分別對那維爾-史托克斯方程式（Navier-Stokes equation）及 Biot 多孔彈性介質理論進行修正，再予以求解之。本文以紊流模式建立在裸露地及水深不及草高兩種不同地表覆蓋條件下，漫地流流況適用之公式。本研究中選用假儉草、百慕達草及類地毯草等三種草種並選用黃壤作為代表，並為與前人之研究相比較，因曼寧公式及運動波公式無法考慮不同草種覆蓋之狀況，故無法求取不同植生狀況下的平均流速，而本研究之結果乃因此較為接近水土保持手冊中的假設值。

關鍵詞：漫地流、紊流、孔隙介質流、Biot 多孔彈性介質理論。

Analytical Solution of Overland Flow by a Turbulent Model

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ABSTRACT　While drawing up conservation of water, soil plans and other related projects, engineers must first consider flow on hilly land surfaces. Engineers often regard surface runoff as overland flow. According to the conservation of water and soil technology standard and the handbook, overland flow is assumed between 0.3~0.6 m/s. Engineers often judge the value subjectively. Flow field are divided into three regions: homogenous water-layer (the flow over vegetation), vegetation-layer (the flow inside vegetation) and permeable soil-layer. Flow inside the soil). The flow inside the vegetation-layer and the soil-layer is porous media flow and the velocity at the ground surface is nonzero. The governing equation is modified from the Navier-Stokes equation and Biot's poroelastic theory. The problem is solved with a turbulent model for non-planted and emergent vegetation. Centipede grass, bermuda grass, carpet grass and yellow loamy soil are adopted in this study. Because the Manning formula and the kinematic wave formula are unable to consider different kinds of vegetation cover, the mean velocity of overland flow of this study is closer to that of the conservation of water and soil handbook.
Conc watersheds for water resources design work.

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

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