

降雨對未飽和層均質土壤入滲補注解析之研究

陳進發^[1] 葉信富^[2] 李振誥^[3]

摘 要 本研究主要目的利用未飽和層水平衡模式進行未飽和層降雨入滲、地表逕流、蒸發散量及地下水補注量之推估，並且與 Kim 於 1996 年推導之模式進行比較。解析模式之假設為 (1)未飽和土壤入滲水呈均一性分佈；(2)土壤依單位水力梯度向下補注。Kim 模式在不考慮土壤之殘餘含水量之狀態下進行地下水模擬，但殘餘含水量之存在將影響土壤之持水能力及土壤孔隙之充水狀態。因此本研究模式考慮土壤在具有殘餘含水量之狀態下進行模式解析。應用模式結合現地觀測資料以求得現地土壤參數校正值。由未飽和層土壤地表入滲、地表逕流、土壤蒸發散及地下水補注量推估結果可獲得兩不同模式之差異性。研究結果顯示，在考慮殘餘含水量及非線性蒸發散之情況下，本研究所推導之模式較 Kim 模式合理。

關鍵詞：入滲、地下水補注、未飽和層、水平衡。

Analysis and Application of Rainfall-Recharge in the Unsaturated Zone

Jin-Fa Chen^[1] Hsin-Fu Yeh^[2] Cheng-Haw Lee^[3]

ABSTRACT A water budget model modified from Kim *et al.* (1996) is developed to estimate the amount of infiltration, surface runoff, evapotranspiration and groundwater recharge in unsaturated soil profiles on the basis of hydraulic and meteorological data. The most assumptions made are (1)an instantaneous redistribution of moisture and (2)drainage under an imposed unit hydraulic gradient. A comparison between the proposed model and the Kim model is also presented. The volumetric residual water content is considered in this study rather than the Kim model. Validation of model is also made using field observation moisture data. Results of the proposed model showed a slightly smaller amount of cumulative infiltration than the Kim model in each kind of soil. In addition, the amount of cumulative groundwater recharge in the Kim model was less than in the proposed model. Mass balance and residual moisture content obviously affected the results of model evaluation. Therefore, the proposed model is more predictive of actual conditions than the Kim model.

Key Words: infiltration, recharge, unsaturated zone, water budget.

[1] 高苑科技大學資訊管理學系助理教授(通訊作者)

Assistant Professor, Department of Information Management, Kao Yuan University, Kaohsiung 821, Taiwan, R.O.C.

(Corresponding Author)

E-mail: jinfa@cc.kyu.edu.tw

[2] 國立成功大學資源工程學系博士班研究生

Doctoral graduate Student, Department of Resources Engineering, National Cheng Kung University, Tainan 701, Taiwan, R.O.C.

[3] 國立成功大學資源工程學系教授

Professor, Department of Resources Engineering, National Cheng Kung University, Tainan 701, Taiwan, R.O.C.