福山地區不同降雨延時之設計雨型歷線推估

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摘　　要 台灣上游集水區較為欠缺降雨特性資料，無法有效應用水文模式推估流量歷線。本研究以台灣東北部福山地區降雨紀錄，分析降雨型態特性，建立降雨-延時-頻率關係，推導不同降雨延時設計雨型歷線及推估公式。獲悉福山地區 6、24 與 72 小時降雨歷線型態為中峰型雨型，12 小時降雨歷線型態為前峰型雨型，48 小時降雨歷線型態為後峰型雨型。採用對數皮爾遜第Ⅲ型分佈法進行頻率分析，建立降雨-延時-頻率經驗推估式。經誤差分析證實福山地區設計雨型歷線推求，以修正位序法較佳，因而採用修正位序法建立不同降雨延時之設計雨型歷線。設計雨型歷線雨峰時間位置：6 小時降雨延時在 50.0%處，12 小時降雨延時在 33.3%處，24 小時降雨延時在 50.0%處，48 小時降雨延時在 58.3%處，72 小時降雨延時在 55.6%。設計雨型歷線雨峰降雨比率：6 小時降雨延時為 31.08%，12 小時降雨延時為 18.60%，24 小時降雨延時為 12.45%，48 小時降雨延時為 10.44%，72 小時降雨延時為 9.02%。同時建立不同降雨延時設計雨型歷線的指數型經驗推估式，顯示效果甚佳。因而結合本文降雨-延時-頻率及設計雨型歷線經驗推估式，僅需輸入降雨延時及頻率年二個參數，即可推定不同頻率年及降雨延時之設計雨型歷線。

關鍵詞：降雨型態、設計雨型歷線、頻率分析。

Design Hyetograph Estimation of Different Durations in the Fushan Area of North-eastern Taiwan

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ABSTRACT Estimating stormflow hydrographs with hydrologic simulation models at upstream watersheds of Taiwan is difficult because of the lack of input information of rainfall characteristics. Analyses of storm pattern characteristics, establishment of rainfall depth-duration-frequency relationships, development of design hyetographs and their estimated equations were carried out in this study with rainfall records of the Fushan weather station in north-eastern Taiwan. Results showed a middle peak storm pattern for hyetographs of 6, 24 and 72-hour durations,

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front peak storm pattern for hyetographs of 12-hour duration, and back peak storm pattern for hyetographs of 48-hour duration at the Fushan area. Rainfall frequency analyses of different hour durations were performed by the log-Pearson type 3 distribution method and an estimated equation of rainfall depth-duration-frequency was also established. Based on error analyses, the modified ranking method showed a good result for solving the design hyetograph of different durations. The time to rainfall peak, expressed by the percentage of rainfall duration, for design hyetographs of 6, 12, 24, 48 and 72-hour duration were 50.0%, 33.3%, 50.0%, 58.3% and 55.6%, respectively. The rainfall peak ratio, expressed by the percentage of total rainfall, for design hyetographs of 6, 12, 24, 48 and 72-hour duration were 31.08%, 18.60%, 12.45%, 10.44% and 9.02%, respectively. Meantime, the estimated equations of exponential type to estimate design hyetographs for different hour durations were established and showed quite good agreement. Therefore, the design hyetographs of different frequency years and durations can be estimated using only two input parameters of frequency year and duration.

Key Words: storm pattern, design hyetograph, frequency analysis.