



## **Incorporating Dependencies between Rainfall Statistics and Rainfall Interannual Variability into Hourly Stochastic Rainfall Generator for Improved Extreme Value Reproduction**

Dongkyun Kim (1), Christian Onof (2), and Jungha Park (3)

(1) Department of Civil Engineering, Hongik University, Seoul, Republic Of Korea (deokaykim@gmail.com), (2) Department of Civil and Environmental Engineering, Imperial College, London, UK, (3) Department of Civil Engineering, Hongik University, Seoul, Republic Of Korea

We present a method to improve the performance of Poisson cluster rainfall models to generate extreme rainfall values at hourly through daily temporal scale. First, we show that Poisson cluster rainfall models have a limitation to reproduce rainfall variability at monthly time scale, which is closely related to extreme rainfall values at sub-daily scale. Then, we present a methodology to incorporate this monthly rainfall variability into the existing framework of Poisson cluster rainfall generation model. This method is composed of the process of generating various rainfall statistics of an individual month considering their interdependencies, the process of parameter estimation of the Modified Bartlett-Lewis rectangular pulse model, and the process of generating rainfall statistics for a duration of a month based on the estimated parameter set. The entire process is repeated to obtain the rainfall time series with the desired length. The proposed approach performed well both in terms of reproducing the 1st, 2nd order statistics as well as the probability of zero rainfall and in terms of reproducing extreme design rainfall values of the observed rainfall time series. In addition, the proposed approach successfully reduced the bias of the runoff and the peak flow values when the synthetically generated rainfall time series were applied in some sample watershed models.