Recent development and application of the rainfall generation models in Korea

Dongkyun Kim (1), Jaemoon Han (2), and Hyunjin Park (2)

(1) Assistant Professor, Hongik University, Seoul, Republic of Korea(kim.dongkyun@hongik.ac.kr), (2) Graduate Research Assistant, Hongik University, Seoul, Republic of Korea

The recent developments and applications of the rainfall models in Korea are highlighted. Firstly, the web application for generating rainfall time series based on the regionalized modified Bartlett-Lewis rectangular pulse (MBLRP) model in Korea and the United States is presented. The performance of the regionalized MBLRP model in reproducing important rainfall statistics including extreme values is presented.

Secondly, the Poisson cluster rainfall model that can account for the inter-annual variability of rainfall with the improved performance in simulating extreme values are presented. The suggested novel approach is capable of reducing the systematic bias in the extreme rainfall values of the traditional MBLRP model by 11% to 39%.

Thirdly, the application of the modified Bartlett-Lewis rectangular pulse model in predicting 2-dimensional urban flooding is presented. Here, the probability density function of the over-flooded area based on the synthetic rainfall time series is compared to that based on the observation.

Lastly, the space-time rainfall generation model based on the multi-fractality of rainfall and its application in urban-flooding is presented. For this purpose, the multifractal behavior of rainfall in Korean Peninsula was investigated using the radar rainfall data, based on which the log-Poisson cascade generator with three-dimensional wavelet was used to create the space-time rainfall field. The generated space-time rainfall field was applied to 2-dimensional urban drainage model to assess the probability density of the flooded area and the volume of the flooded water, which is compared to that based on the observation.