C19

Experimental Study on Validation of Combined Model for Urban Inundation Analysis

○Seungsoo LEE, Hajime NAKAGAWA, Kenji KAWAIKE, Hao ZHANG

Recently, there have been a lot of numerical models for prediction of urban inundation damage due to the climate change and heavy rainfall by using the combined drainage system. Therefore, it is important to accurately simulate urban hydrological processes and efficiently predict the potential risks of urban floods for the improvement of drainage designs and implementation of emergency actions. In order to solve these kinds of problems, numerical simulation models of flood inundation in urban environments with two-dimensional models have become more popular in the last few years. However, the urban environment is highly heterogeneous in terms of land use, drainage systems, and other factors which influence the processes of the water cycle, including rainfall, surface runoff, infiltration and movement of water in the subsoils, interaction between surface water and groundwater, interaction between the drainage network and groundwater, and evapotranspiration. In addition to these complex interactions, there is a well-recognised lack of experimental data to validate and compare the performance of flood inundation models, most studies of urban flooding being devoted to model sensitivity analysis.

The sewer system is one of the most important factors in urban flood inundation models and the inlet discharge through the storm drains is also very important data as an input data of sewer system. However, it is very difficult to estimate how much of discharge on the ground surface is drained through storm drains. Also, discharge coefficient of each formula is different depending on research groups.

Hence in this study, firstly, laboratory scale experiments to measure the inlet discharge coefficients of weir and orifice equation which are widely accepted and commonly used are carried out and then the coefficients of both equations are suggested. Secondly, another laboratory scale experiments are carried out in order to secure validation data which can be used in numerical simulation. Finally, the numerical simulation of stormwater interaction between the ground, drainage system and sewer system in order to estimate application of suggested coefficients is validated based on physical experiment which is shown in the Fig. 1. This experimental setup consists of a rainfall supplier, a surface flood plain with buildings, a sewer pipe and connection pipes between them. From the comparison between experimental, simulation piezometric heads and discharge of the sewer pipe, the above mentioned discharge coefficients and equations are validated.

Figure. 1 Experimental setup