Storm Inundation Simulation for an Urban Small Watershed by the Tokyo Storm Runoff Model

Hideo AMAGUCHI[#+], Akira KAWAMURA

Tokyo Metropolitan University, Japan

[#]Corresponding author: amaguchi@tmu.ac.jp [+]Presenter

Heavy rainfall and poor drainage facilities cause inundations in urban catchment in Japan. The inundation are complex because river overflow is added to poor drainage system along rivers. Moreover, such areas are at high risk for flood damage because of the high concentration of houses. As a result, not only the improvement of rainwater drainage facilities is deemed important for flood control, but also assessments and reviews of inundation risks through inundation simulations. Inundation depth is the most important information and this is used as the basis for calculating the cost of damage for assessing flood control projects.

The simultaneous flow analysis of rainwater is generally applied for inundation models. Examples of such models include regular mesh-shaped grid, unstructured grid and street network model. Usually buildings in these analytical grids are assumed to be resistant to inundation, and inundation depth is not calculated individually. In most cases, the inundation depth of the buildings is deemed to be the same as the water depth of the analytical grid.

In this paper, a vector-based distributed storm event runoff model – the Tokyo Storm Runoff (TSR) model – is applied for urban storm-inundation analysis. The set-up of this model is based on urban landscape GIS delineation that faithfully describes the complicated urban land use features in detail. The model was set up and evaluated for the upper Kanda catchment in Tokyo Metropolis, Japan. The general model formulation was used with standard parameter values obtained from the literature. The runoff response to a storm event was simulated. It was also demonstrated how the model can be used to evaluate the flow conditions in specific components of the urban hydrological system, which facilitates e.g. evaluation of flood-preventive measures.