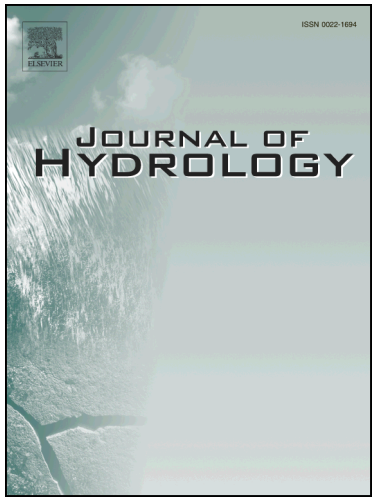

Research papers

Effect of inlet modelling on surface drainage in coupled urban flood simulation

Jiun-Huei Jang, Tien-Hao Chang, Wei-Bo Chen

PII: S0022-1694(18)30339-1
DOI: https://doi.org/10.1016/j.jhydrol.2018.05.010
Reference: HYDROL 22787

To appear in: *Journal of Hydrology*

Received Date: 25 March 2018
Revised Date: 30 April 2018
Accepted Date: 5 May 2018

Please cite this article as: Jang, J-H., Chang, T-H., Chen, W-B., Effect of inlet modelling on surface drainage in coupled urban flood simulation, *Journal of Hydrology* (2018), doi: https://doi.org/10.1016/j.jhydrol.2018.05.010

Effect of inlet modelling on surface drainage in coupled urban flood simulation

Jiun-Huei Jang[1,*], Tien-Hao Chang[1], Wei-Bo Chen[2]

[1] Department of Hydraulic and Ocean Engineering, National Cheng Kung University, Tainan, Taiwan
[2] National Science and Technology Center for Disaster Reduction, New Taipei City, Taiwan

Abstract

For a highly developed urban area with complete drainage systems, flood simulation is necessary for describing the flow dynamics from rainfall, to surface runoff, and to sewer flow. In this study, a coupled flood model based on diffusion wave equations was proposed to simulate one-dimensional sewer flow and two-dimensional overland flow simultaneously. The overland flow model provides details on the rainfall-runoff process to estimate the excess runoff that enters the sewer system through street inlets for sewer flow routing. Three types of inlet modelling are considered in this study, including the manhole-based approach that ignores the street inlets by draining surface water directly into manholes, the inlet-manhole approach that drains surface water into manholes that are each connected to multiple inlets, and the inlet-node approach that drains surface water into sewer nodes that are connected to individual inlets. The simulation results were compared with a high-intensity rainstorm event that occurred in 2015 in Taipei City. In the verification of the maximum flood extent, the two approaches that considered street inlets performed considerably better than that without street inlets. When considering the aforementioned models in terms of temporal flood variation, using manholes as receivers leads to an overall inefficient draining of the surface water either by the manhole-based approach or by the inlet-manhole approach. Using the inlet-node approach is more reasonable than using the inlet-manhole approach