

A Fuzzy Control System for Reducing Urban Stormwater Runoff by a Stormwater Storage Tank

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Abstract : Stormwater storage tank (SST) is a popular low impact development technology for reducing stormwater runoff in the construction of sponge city. At present, it is difficult to perform the automatic control of SST for reducing peak flow. In this paper, fuzzy control was introduced into the peak control of SST to improve the efficiency of reducing stormwater runoff. Firstly, the design of SST was investigated. A catchment area and a return period were assumed, a SST model was manufactured, and then the storage capacity of the SST was verified. Secondly, the control parameters of the SST based on reducing stormwater runoff were analyzed, and a schematic diagram of real-time control (RTC) system based on peak control SST was established. Finally, fuzzy control system of a double input (flow and water level) and double output (inlet and outlet valve) was designed. The results showed that 1) under the different return periods (one year, three years, five years), the SST had the effect of delayed peak control and storage by increasing the detention time, 2) rainfall, pipeline flow, the influent time and the water level in the SST could be used as RTC parameters, and 3) the response curves of flow velocity and water level fluctuated very little and reached equilibrium in a short time. The combination of online monitoring and fuzzy control was feasible to control the SST automatically. This paper provides a theoretical reference for reducing stormwater runoff and improving the operation efficiency of SST.

Keywords : stormwater runoff, stormwater storage tank, real-time control, fuzzy control

Conference Title : ICCEABME 2018 : International Conference on Civil Engineering, Architecture, Building Materials and Environment

Conference Location : Paris, France

Conference Dates : March 15-16, 2018