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Urban Storm Sewer Optimal Layout Design Model by DDDP Technique

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Rapid expansion of urban area since has caused the difficulties to discharge the flood in urban area watershed. Building the rational and optimal urban sewer network in urban area is very important to overcome the flood disaster. Sewer network installation needs two important requisites; the first is runoff analysis including design discharge and the second network layout design optimized economically. Many researches for runoff analysis as well as efforts to attenuate peak flows in urban watershed have been doing well. But layout design technology, relatively, has less devoted to develop network system or assessment methodology. What is interested in sewer layout design nowadays is not only how to discharge peak flow but also how to set up economic layout condition with results of simulated design discharge. This study aims at developing simulation model which might come up with the optimal condition of pipe capacity, slope, water depth and return cost in terms of least cost optimization in urban sewer layout design according to design discharge. In order to evaluate the risk at each state, first order second moment approximation was adopted to uncertainty analysis in the riskreliability relationship, which would be able to calculate the risk cost of the element. And DDDP(Discrete Differential Dynamic Programming) which is application of DP(Dynamic Programming) is used as an optimization technique in the sewer layout design. C-language was used to code the model and analyzed node-link structure for manhole-sewer pipe. This model was applied to a newly developed resident area in to assess the installed sewer network layout. As a result, the method in this study could suggest the more optimal condition to about 9% attenuation in terms of return cost considering risk.