

Comparison of Different Hydrograph Routing Techniques in XPSTORM Modelling Software: A Case Study

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Abstract : A variety of routing techniques are available to develop surface runoff hydrographs from rainfall. The selection of runoff routing method is very vital as it is directly related to the type of watershed and the required degree of accuracy. There are different modelling softwares available to explore the rainfall-runoff process in urban areas. XPSTORM, a link-node based, integrated storm-water modelling software, has been used in this study for developing surface runoff hydrograph for a Golf course area located in Rockhampton in Central Queensland in Australia. Four commonly used methods, namely SWMM runoff, Kinematic wave, Laurenson, and Time-Area are employed to generate runoff hydrograph for design storm of this study area. In runoff mode of XPSTORM, the rainfall, infiltration, evaporation and depression storage for sub-catchments were simulated and the runoff from the sub-catchment to collection node was calculated. The simulation results are presented, discussed and compared. The total surface runoff generated by SWMM runoff, Kinematic wave and Time-Area methods are found to be reasonably close, which indicates any of these methods can be used for developing runoff hydrograph of the study area. Laurenson method produces a comparatively less amount of surface runoff, however, it creates highest peak of surface runoff among all which may be suitable for hilly region. Although the Laurenson hydrograph technique is widely acceptable surface runoff routing technique in Queensland (Australia), extensive investigation is recommended with detailed topographic and hydrologic data in order to assess its suitability for use in the case study area.

Keywords : ARI, design storm, IFD, rainfall temporal pattern, routing techniques, surface runoff, XPSTORM

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