



Modelling of synthetic rainfall-runoff flood patterns

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In the field of flood management of reservoirs, a deterministic single design event approach is usually used when systems are planned or controlled. The design event is represented by the hydrogram of a theoretical flood wave with a given exceedance probability of the peak flow. Actually, it is probable that many different flood waves with the same or almost the same peak flow can occur but their time development and the volume can vary significantly from the theoretical one. It is evident that the time course and the volume of the flood hydrogram have also very important influence on the flood control function of reservoirs, as well as the peak flow has. Our contribution introduces a methodological approach, when water management systems are designed and controlled with the use of synthetic rainfall-runoff patterns, simulated by the stochastic weather generator and the deterministic hydrological model. Firstly, a daily time series of rainfall depths and air temperatures were generated. A daily rainfall generator consists of the precipitation occurrence model, which is based on the Markov's chain theory and it simulates sequences of dry and wet days. The precipitation amount model consequently generates rainfall depths in wet days. In the second step, the daily rainfalls were disaggregated into 3-hours amounts with the use of the random cascade method and the daily temperatures were disaggregated into 1-hour values by the method of fragments. These series were consequently transformed by already calibrated deterministic hydrological model for the studied watershed. A plenty of different flood events have occurred in the derived long-term continuous rainfall-runoff simulation which were further statistically evaluated with respect to their peak flow and the flood volume. Particular flood waves differ in their genesis and they can be generally divided to summer floods caused by extreme rainfall events and to winter floods caused especially by the intensive snow melt. Data sets of rainfall-runoff patterns can be consequently used for the flood management optimisation. This research has been supported by the grant No. 103/07/1620 of the Grant Agency of the Czech Republic.