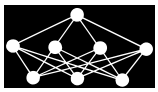

UNCERTAINTY MODELLING IN RAINFALL-RUNOFF SIMULATIONS BASED ON PARALLEL MONTE CARLO METHOD

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Abstract: This article describes statistical evaluation of the computational model for precipitation forecast and proposes a method for uncertainty modelling of rainfall-runoff models in the Floreon$^+$ system based on this evaluation. The Monte-Carlo simulation method is used for estimating possible river discharge and provides several confidence intervals that can support the decisions in operational disaster management. Experiments with other parameters of the model and their influence on final river discharge are also discussed.

Key words: *Rainfall-Runoff, uncertainty modelling, kernel density estimation, Monte Carlo method, high performance computing*

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1. Introduction

Rainfall-runoff (R-R) model is a dynamic mathematical model that transforms rainfall to the flow at the catchment outlet. The main purpose of the model is to describe rainfall-runoff relations of a catchment area. Common outputs of the model are surface runoff hydrographs, which depict relations between discharge Q and time t. In many countries, R-R models are usually used for predicting surface runoff within river catchments. One of their inputs is an information about weather conditions in the near future. These data are provided by numerical weather forecast models, such as ALADIN (Aire Limite, Adaptation Dynamique, Development International) [5]. However, weather forecast models are affected by errors that can severely affect precision of the modelling results and the magnitude of the error depends on a lot of factors such as wind, topography, temperature or humidity. One of the most sensitive components of the R-R models is the forecast rainfall intensity. As the rainfall intensity is a key element of rainfall-runoff modelling, we

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