



## **Spatial rainfall simulation for hydrological modelling**

### **1 P. Willems**

Katholieke Universiteit Leuven, Hydraulics Laboratory, Belgium  
([Patrick.Willems@bwk.kuleuven.ac.be](mailto:Patrick.Willems@bwk.kuleuven.ac.be) / Fax: +32 16 321989 / Phone: +32 16 321658)

For the Flanders region of Belgium, a stochastic spatial rainfall generator has been developed, which can generate spatial rainfall from the spatial scale of small urban catchments up to the scale of river basins (with an area of around 1000 km<sup>2</sup>). Procedures have been developed for the use of this generator in hydrological modelling applications of urban and rural catchments, to account for the spatial variability of rainfall. The efficiency of different methods to reduce this influence is investigated.

For design rainfall applications, the spatial variability of the statistical properties of point rainfall is investigated in the form of unified IDF-relationships for the whole Flanders region, and the spatial rainfall dynamics accounted for by means of a concept of moving design storms. For hydrological applications with continuous rainfall simulation, areal correction factors have been developed (generally applicable formulas for Flanders), to be used in combination with historical rainfall series. The stochastic simulation model was used for the generation of synthetic spatial rainfall, and for improving the spatial correction factors in a case-specific way by performing simulations with the model. The conceptual rain storm model underlying the spatial rainfall generator was also tested for spatial rainfall interpolation.

Spatial rainfall data have been used from both dense networks of rain gauges, and from radar. The methods are tested for four Belgian case studies: the sewer system at the village of Dessel (492.8 ha), the hydrographic subcatchments of the Molenbeek brook upstream of the village of Erpe-Mere (47 km<sup>2</sup>) and the Bellebeek brook (88.5 km<sup>2</sup>), and the larger basin of the river Dender (708 km<sup>2</sup>).