



PhD defence by

M.Sc. Søren Thorndahl

on

Uncertainty assessment in long term urban drainage modelling

Monday, April 14th, 2008 at 13.00 hour

Room F-108, Building A, Sohngaardsholmsvej 57, 9000 Aalborg

The work has been carried out at Aalborg University, Department of Civil Engineering and was supervised by Associate Professor Kjeld Schaarup-Jensen and Part-time Lecturer Jacob Birk Jensen.

Abstract: The thesis covers a general introduction and a combination of seven papers on the subject of uncertainty assessment in urban drainage modelling. Urban drainage models applied for design and analysis of urban drainage systems are uncertain due to uncertainty in parameter assessment and especially on the rainfall inputs. In order to handle the uncertainties three different stochastic approaches are investigated applying a case catchment in the town Frejlev: (1) a reliability approach in which a parameterization of the rainfall input is conducted in order to generate synthetic rainfall events and find the probability of system failures (defined as either flooding or surcharge of manholes or combined sewer overflow); (2) an application of the Generalized Likelihood Uncertainty Estimation methodology in which an event based stochastic calibration is performed; and (3) long term Monte Carlo simulations with the purpose of estimating the uncertainties on the extreme event statistics of maximum water levels and combined sewer overflow volumes in drainage systems.

The thesis concludes that the uncertainties on both maximum water levels and combined sewer overflow volumes are considerable, especially on the large return periods, and even within the return periods specified in the design criteria. If urban drainage models are based on standard parameters and hence not calibrated, the uncertainties are even larger. The greatest uncertainties are shown to be the rainfall input and the assessment of the contributing area.

The thesis is available at <http://www.civil.aau.dk/~i5st/>

Assessment committee

Associate Professor, Dr., Jean-Luc Bertrand-Krajewsky

LGCIE - Laboratoire de Génie Civil et d'Ingénierie Environnementale, INSA de Lyon, FR

Associate Professor, Dr., Peter Steen Mikkelsen

Department of Environmental Engineering, Technical University of Denmark

Associate Professor, Dr., Michael R. Rasmussen (Chairman)

Department of Civil Engineering, Aalborg University

On behalf of the Faculties of Engineering, Science and Medicine at Aalborg University the meeting will be chaired by Professor Torben Larsen.

All interested are welcome. After agreement with the chairman of the meeting questions can be asked to the candidate. After the lecture there will be a reception in Room C-119.

Kjeld Schaarup Jensen