Universität Stuttgart

WAREM
Water Resources Engineering and Management

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Universität Stuttgart WAREM, Pfaffenwaldring 7, 70569 Stuttgart

Pfaffenwaldring 7
70569 Stuttgart
Telefon: (0711) 685 - 66615 / 66616
Telefax: (0711) 685– 66600
warem@iws.uni-stuttgart.de
http://www.warem.uni-stuttgart.de/

Anne Weiss M.A., M.Sc.
(Durchwahl: - 66616)

Master Thesis Abstract

By: Aron Negusse Asfaha

Optimal Design of Pressure Measurement for Stochastic Calibration of Water Distribution Hydraulic Models

This thesis focuses on establishing a meaningful relationship between information gain and the required acceptable model calibration. The calibration of water Distribution (WD) models is key to any analysis, design evaluation or assessment to be carried out on the WD pipe networks. Several calibration procedures have been developed through the years but still much progress needs to be made, to tackle the challenges in water distribution. The extensive costs and time wasted in acquiring measurement (pressure) data for calibration has made the company RBS-wave doubtful of its efficiency since no hard and fast rule exist to govern measurements. Ac-cording to the German standards for gas and water works (DVGW) regulation only a minimum recommended use of pressure measuring instruments are provided. In reference to this number the RBS-wave uses four times as much measuring instruments. This boosted the motivation of this thesis to aim at optimizing the number and location of pressure measuring instruments sufficient to provided calibration within acceptable limits. A tool for probabilistic assessment, within the Bayesian framework was adopted from a previous thesis on which this thesis is based. Hence an assessment on calibrated project of the RBS-wave was carried out to achieve similar calibration results but with less measurement information. This guided the second phase of the thesis where a synthetic distribution network was developed to calibrate and identifying the intentional installed network errors by systematically placing the loggers at nodes were high values of coefficient of variation were expressed. Four scenarios were created and analysed to narrow the gap between the recommended DVGW number of measuring instruments, and the number of instruments used by the RBS-wave to achieve optimal use of instrumentation for measurement.