Automated meter reading for water demand forecast and hydraulic modelling of the municipal water distribution system in Mikołów, Poland

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Abstract:

This paper presents preliminary results of a project aimed at utilising automated meter reading (AMR) system for water demand forecasting and hydraulic modelling of Mikołów (Poland) water distribution system. This system will allow for near-real time collection of hydraulic data.

Accurate estimation and prediction of the demand patterns of the customers is a crucial element affecting accuracy of hydraulic model. AMR will be used to analyse the behaviour of individual household-based water consumption. Calibration and validation of the model will be realised by combining existing SCADA system and mobile (temporary) measurement points.

Total length of the main water distribution system in Mikołów (pop. 40 000) is about 310 km, with 117 km of service pipelines. Water in amount of 300 000 m³ per month is supplied to over 7600 individual clients and bulk (industrial) customers. All connections to water network will be equipped with automated meter and incorporated into existing monitoring system. The existing telemetry system for Mikołów is composed of 30 stations measuring flow rate and pressure in the water distribution network (WDN).

A hybrid AMR system will be used. It combines local reading of meters by two-way RF units with telemetry stations sending signals using mobile network (GSM) to the main database server. This server contains a database of water consumption readings for individual customers.

To take advantage of the AMR system a detailed hydraulic model of the Mikołów WDN was build. The hydraulic model will be later coupled with an integrated ICT system for comprehensive management of the water distribution network. The seamless connection between model and GIS, CIS and SCADA modules will allow for the network topology update, automatic re-calibration, water demand reading and forecasting.
Keywords:

hydraulic modelling, meter reading service, water network, demand forecasting, remote sensing

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