Hydraulic modelling and calibration of the Upper Silesian Waterworks in Poland

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Abstract:

Our paper presents the preliminary results of hydraulic modelling and calibration of a complex water transfer and distribution system of Upper Silesian Waterworks PLC (USW). A new approach to quasi real-time model calibration and validation in connection with an integrated ICT system will be presented.

The USW is the biggest water company in Poland and one of the biggest in Europe delivering water to over 3 million customers in Silesian Metropolis, on the area covering about 4.3 thousand square kilometres, with the main water network which is over 880 km long. This water distribution system incorporates central and western sub-regions of Silesia (Silesian Metropolis) supplying water in the amount of about 400 000 m$^3$/d. The USW water transportation system is a combination of pressure and gravity mains (with diameters ranging between 300 mm and 1800 mm) conveying the water to several local (municipal) distribution systems and bulk buyers (industrial).

The area is characterised by a great diversity of terrain altitude, heavy concentration of industry and severe mining damages. This dynamic environment requires constant update of WDN topology and real-time water demand from wholesale customers (towns and cities, coal mines, steel, energy, automotive, machinery and chemical industry).

For calibration and validation of hydraulic model we used the extensive telemetry system composed of 180 monitoring stations (including wholesale customers meters, reservoirs, tanks, pumping stations etc.). This system contains over 800 sensors measuring flow rate, pressure, turbidity and chlorine residual. The existing database of measurements will be temporarily supported by mobile measurement points used for identification of hydraulic properties of selected groups of pipelines.
Hydraulic model (based on EPANET) is an element of the integrated ICT system for comprehensive water network management, consisting of several modules: GIS, CIS, SCADA as well as tools for multi-criteria optimisation and forecasting.

**Keywords:**

water distribution, calibration, real-time, case-study, pipe network

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