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LEAKAGE ASSESSMENT IN WATER DISTRIBUTION NETWORKS USING HYDRAULIC MODEL CALIBRATION

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Abstract

A hydraulic analysis of Egypt's district metered area (DMAs) is a significant undertaking that creates a permanent monitoring system and eliminating leaks is highly expensive and time-consuming. More than 40% of water networks in Egypt are over 40 years old. Consequently, Egypt loses around 30% of daily water produced, which accounts for 25.5 Million m^3. In this study, Darwin Calibrator was used to predict the proximate location of water leakage in a DMA. This study presents a physically-based method for WDNs calibration of hydraulic models which intends to support leakage, assessment, monitoring and management from the initial stages. Results indicated that the mean pressure (Pa) for inlet at Elshewash measuring point was 20.89 (Pa) and the mean flow was 18.3 (m^3). Conversely, mean pressure for outlet was 18.3 (Pa) and mean flow was 8.22 (m^3). At Rawafee El Quser measuring points was1.89 (Pa) at the inlet point and mean flow was 17.42 (m^3). However, at outlet mean pressure was 1.81(Pa) and mean flow was 6.3 (m^3). In all the networks where the node's pressure and input discharge were introduced to the program as observational data, leakage location was determined at or in the exact location. The location and the amount of leakage were calculated. These results were similar to the leakage resulting from the field inspection. It is inferred that the model calibration could lead to a reduction of water leakage by increasing predictive capacity and monitoring instruments, establishing an instant pressure control mechanism and optimising pipe maintenance strategy. These actions could benefit the environment as a result of water and energy savings.

Keywords: leakage, nonrevenue water, sustainability, water management, water distribution networks

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