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Streszczenie rozprawy doktorskiej nt.:

„Ocena zmienności chemicznych parametrów jakości wody w systemie wodociągowym"

"Assessment of variability of water chemical parameters in water supply system"

In the 21st century, for the first time in history, half of the world's human population lives in urban areas (UNFPA, 2007). Predicting and managing urban water demand is complicated by the tightly coupled relationship that exists between human and natural systems in urban areas (House-Peters and Chang, 2011). The water supply network is one of the strategic objects of the municipal infrastructure. It is one of the most important and most expensive elements of the water supply system (60 ÷ 90% of the costs of the entire system), at the same time the network plays a very important role due to the reliability of water supply to recipients. The inefficiency of the water supply system worsens the living comfort of the inhabitants and leads to the loss of security of water supply. The dispersed structure of the water supply network, variability of operating parameters, and the simultaneous need to make many decisions at the same time make the management of such infrastructure a complex process (Lee and Wentz, 2008). This difficult decision-making process can be supported by available geographic information systems. Results of the analyses performed on the hydraulic models may be helpful in making decisions related to modernization and extension of the water supply systems. They also allow for minimization of the effects of random events and thus for reduction of the risk and costs incurred by water supply companies.

Water demand is generated through dynamic and continually evolving processes on the basis of multiscale interactions between human agents and the natural world. Most of the demand function is structured in a static form, however studies have shown that current water use is highly dependent on the size of the water supply system, the number of consumers, the extent of the network and other dynamic factors (House-Peters and Chang, 2011). This discovery has led to an increasing demand for the development and implementation of dynamic models.

In large cities, water from water treatment plants reaches consumers through a pipeline system that can be as long as several thousand kilometers. Advanced technologies and modern water treatment processes are in many cases insufficient. The composition of the water in the water supply system is changed by the physical, chemical and biochemical processes in the network. Phenomena occurring in water supply networks, installations and devices cause deterioration of water quality at the stage of its distribution. Modeling the parameters of water networks, while ensuring appropriate data processing, is an essential element in making optimal decisions in the process of managing and operating water networks due to the established, often very complex criteria.

keywords: secondary water contamination, water supply network, water quality

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Podpis Doktoranta