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Real-Time Monitoring of Drinking Water Quality Using Advanced Devices

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Abstract : The quality of drinking water is a major concern of public health. The control of this quality is generally performed in the laboratory, which requires a long time. This type of control is not adapted for accidental pollution from sudden events, which can have serious consequences on population health. Therefore, it is of major interest to develop real-time innovative solutions for the detection of accidental contamination in drinking water systems This paper presents researches conducted within the SunRise Demonstrator for 'Smart and Sustainable Cities' with a particular focus on the supervision of the water quality. This work aims at (i) implementing a smart water system in a large water network (Campus of the University Lille1) including innovative equipment for real-time detection of abnormal events, such as those related to the contamination of drinking water and (ii) develop a numerical modeling of the contamination diffusion in the water distribution system. The first step included verification of the water quality sensors and their effectiveness on a network prototype of 50m length. This part included the evaluation of the efficiency of these sensors in the detection both bacterial and chemical contamination events in drinking water distribution systems. An on-line optical sensor integral with a laboratory-scale distribution system (LDS) was shown to respond rapidly to changes in refractive index induced by injected loads of chemical (cadmium, mercury) and biological contaminations (Escherichia coli). All injected substances were detected by the sensor; the magnitude of the response depends on the type of contaminant introduced and it is proportional to the injected substance concentration.

Keywords : distribution system, drinking water, refraction index, sensor, real-time
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