DETECTION OF THE NATURAL GAS PIPELINE LEAK WITH INFRARED IMAGE IN SPECIFIC ABSORPTION CHANNEL

Haohao Wu[1], Wenjing He[1], Chuncheng Zhou[1], Lingling Ma[1], Lingli Tang[1], Chuanrong Li[1]

[1] Key Laboratory of Quantitative Remote Sensing Information Technology,
Academy of Opto-Electronics, Chinese Academy of Sciences,
No.9 Dengzhuang South Road, Haidian District, Beijing, China, hhwu@aoe.ac.cn

Abstract：Leak of natural gas pipeline can pose deadly risk to workers and present a loss of product for industry. Therefore, the timely detection of potential leak points of any part of the pipeline and valve groups is critical to ensure the reliability of the natural gas delivery infrastructure. In this paper, a method was presented to detect the gas leak with Medium-Wave Infrared (MWIR) image. MWIR imaging detects gas leaks from pipelines due to the differences in radiance between the gas and the immediate surroundings. Since the absorption of methane, the main component of natural gas, in MWIR region (3.4um) can weaken the radiance power from background remarkably, the gas leaks appear as black smoke in MWIR image and the leak points can be identified by inspector or automatically by feature recognition and Motion Detection technique. To acquire proper MWIR image, a MWIR imaging system worked in methane absorption channel was developed. A series of images and videos of simulant leak points, with different wind speed (0 to 2m/s) and leakage rate (5 to 20ml/s), were taken by this system. The result of leak detection in these cases is properly and indicates the feasibility of the method. The advantage of this method is that can be used from portable systems, moving vehicles or helicopters and it is possible to checks out massive pipeline in a short time.

Keyword: Gas leak detection, MWIR imaging, Absorption channel