输油管道泄漏检测系统的总体设计和软硬件的实现

摘 要

管道运输是非常重要的行业，它反映了工业与经济的发展状况，是国家发展中必不可少的部分。但管道一旦出现不同程度的老化、腐蚀就可能出现泄漏，将对环境造成极大的污染，甚至会出现危及生命的情况。为了减少泄漏事故的发生，开发泄漏检测系统是很有必要的，可以对泄露位置做出准确的判断并进行及时分析。

本文对国内与国外输油管道泄漏技术进行充分研究，分析负压波传播规律，波速计算方法，并针对输油管道的特点，分析了负压波泄漏检测技术的定位原理以及影响准确定位的关键因素。将流量平衡法运用在判断管道泄漏上，并运用 GPS 将首末站信号进行同步，运用多种技术设计出泄漏检测系统。并在陕西某管线进行试验验证，得到了较好的试验效果，当泄漏量多时，系统检测结果比较准确，泄漏量少时，系统的灵敏度尚需提高。

关键词：输油管道；泄漏检测；负压波；定位

Abstract

Pipeline transportation is a very important industry, which reflects the industrial and economic development and is an indispensable part of national development. However, the aging and corrosion degree of pipelines are different, which will cause environmental pollution and casualties. In order to reduce the occurrence of water leakage accidents, it is necessary to develop a water leakage sensing system, correctly judge the location of water leakage, and timely analyze the location.

In this paper, the leakage technology of domestic and overseas oil pipelines is fully studied, the propagation law of sound pressure and the calculation method of wave velocity based on the characteristics of oil pipelines are analyzed, and the positioning principle and the main factors affecting the correct positioning of the leakage detection technology of sound pressure wave are analyzed. The method of flow balance is suitable for the chord to identify the leakage. The leakage induction system is studied by using GPS synchronous signal and various processes. The experimental results of Shaanxi pipeline are satisfactory, but if the leakage is large, it can accurately show the system. If the leakage is small, the system will feel sluggish.

Key words: Petroleum pipeline ; Leak detection; Negative pressure wave; Location

目 录