

## 波形相关性算法在超声波测厚中的应用

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## Application of waveform correlation algorithm in ultrasonic thickness testing

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摘要 图/表 参考文献 相关文章 (14)

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**摘要** 压缩天然气(CNG)地下储气井由于长期受井中的积液和地下水的作用,其管道壁会出现局部变薄,而剩余厚度决定了管道的后续使用年限。本文针对采用传统的超声波检测方法测量管壁厚度,具有数据量大、干扰多、精度较低等缺点,提出一种改进测厚算法。该算法使用特征值查找和波形相关性算法来获取回波时间。描述了检测原理和相关性算法,分析了影响测量精度的因素。以一段标样管为检测对象,进行了检测和结果分析。最后,将提出的算法运用于储气井检测现场。通过对江苏省内6个加气站进行实地试验,验证了提出的波形相关性算法的精确性,其测厚精度可达到0.03 mm。提出的算法解决了目前储气井腐蚀检测数据处理算法易出错、精度不高等问题。

**关键词**: 储气井, 管道, 管壁厚度, 超声波测厚, 波形相关性算法

**Abstract**: The pipe wall of Compressed Natural Gas(CNG) storage well will be thinned locally because of the corrosion of drain fluids and underground water in the well for a long time, and the remaining thickness of the pipe wall can decide the service life of pipe. This paper proposes an improved thickness measuring method to overcome the shortcoming of the traditional ultrasonic detection method in larger data mounts, much interference and lower measuring accuracy. In the proposed algorithm, the eigenvalue search and waveform correlation algorithm are exploited for echo time acquisition and theoretical analysis. The detection principle and corresponding algorithm are described, and effect factors on measuring accuracy is analyzed. By taking a sample tube as the testing object, the experiments are carried out. Finally, the algorithm is used in the field detection of the CNG storage well. The CNG storage wells of 6 gas stations in Jiangsu Province is detected, and the feasibility of proposed algorithm based on waveform correlation was verified. The results show that the accuracy of thickness measuring is up to 0.03 mm, which is better than others in pipe erosion thickness testing.

**Key words**: storage well pipe pipe wall thickness ultrasonic thickness testing waveform correlation algorithm

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