

过程系统工程

基于支持向量机的管道腐蚀超声波内检测

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摘要

超声波检测是输油管道在线内检测的重要方法之一, 由于管道内部检测环境复杂, 使超声检测回波信号识别困难, 其分类是一个高维分类问题。利用支持向量机在解决小样本、非线性、高维模式识别中特有的优势, 直接采用表征超声回波形态的A扫描数据作为特征向量, 将特征提取与模式分类统一进行, 建立了管道腐蚀超声检测回波信号分类决策函数, 实现了管道腐蚀缺陷识别。实验结果表明, 该方法可以正确地分类识别管道腐蚀产生的突变界面, 基于支持向量机的管道腐蚀超声内检测信号分类识别方法是可行、有效的。

关键词

[超声检测](#) [管道检测](#) [支持向量机](#)

分类号

Ultrasonic in-line inspection of pipeline corrosion based on support vector machine

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Abstract

Ultrasonic detection is one of the important ways to inspect the wall-loss defects and cracks in-line for oil pipeline. Because of the complicated condition in pipeline the recognition of ultrasonic detection echoes is difficult. This is a high-dimensional classification problem. An effective method based on support vector machine (SVM), which is suitable for small-sample, non-linear and high-dimensional recognition for classification and recognition of pipeline corrosion defects was presented. The ultrasonic A-scan time-series were considered characteristic vectors. By unifying the characteristics extraction and pattern recognition of pipeline corrosion defects the classified decision function of ultrasonic detection echo signals was established. Experiments showed that the classified recognition of break interfaces of pipelines was accurate and clear and the method was suitable for in-line detection of pipeline corrosion defects.

Key words

[ultrasonic inspection](#) [pipeline inspection](#) [support vector machine](#)

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