

发电

基于图像纹理特征和Elman神经网络的气液两相流流型识别

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摘要

气液两相流广泛存在于现代工业生产之中, 其流型极大地影响气液两相流的流动和传热特性, 为此提出了一种图像灰度直方图统计特征和Elman神经网络相结合的气液两相流流型识别方法。该方法利用高速摄影系统获取水平管道内两相流的流动图像, 经过图像处理, 提取图像灰度直方图统计特征, 进而建立流型的图像统计特征向量, 并以此特征向量作为流型样本对Elman神经网络进行训练, 实现对流型图像的智能识别。实验结果表明, 训练成功的Elman神经网络能有效识别水平管道内7种典型流型, 整体识别率达98.6%, 为流型在线识别提供一种新的有效方法。

关键词 [两相流](#) [流型过渡准则](#) [图像处理](#) [Elman神经网络](#)

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Identification Method of Gas-liquid Two-phase Flow Regime Based on Images Processing and Elman Neural Network

Abstract

Gas-liquid two-phase flow widely exists in modern industry process. Two-phase flow and heat transfer character are extremely influenced by the flow regimes. Therefore, a flow regime identification method based on images statistical features of gray histogram and Elman neural network was proposed. Gas-liquid two-phase flow images were captured by high speed video system in horizontal pipe. The images statistical features of the gray histogram were extracted using image processing techniques. Then, images statistical eigenvectors of flow regime were established. Elman neural network was trained using those eigenvectors as flow regime samples, and the flow regime intelligent identification was realized. Test results show that successful training Elman neural network can effectively identify seven typical flow regimes of gas-water two-phase flow in horizontal pipe. The whole identification accuracy is 98.6% and it is a new and effective method for flow online identification.

Key words [two-phase flow](#) [flow pattern transition](#) [image processing](#) [Elman neural network](#)

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