

多相流和计算流体力学

高压浓相粉煤气力输送特性及信息熵分析

梁财, 陈晓平, 蒲文灏, 鹿鹏, 范春雷, 赵长遂

东南大学洁净煤发电及燃烧技术教育部重点实验室

收稿日期 2006-5-11 修回日期 2007-1-12 网络版发布日期 2007-5-29 接受日期

摘要 在输送压力可达4.0MPa, 固气比高达450kg/m³的高压气力输送试验台上, 用氮气进行粉煤高压浓相气力输送试验研究。分别在不同的输送差压、浓度和速度等条件下进行了输送试验, 考察操作参数对煤粉固气比等气力输送特征参数的影响, 用信息熵分析试验过程中采集到的压力波动时间序列, 探讨流动稳定性和流型变迁过程中信息化趋势, 建立信息熵和流型之间的关系。结果表明在输送差压增大的过程中, 固气比和Shannon信息熵均增大; 气体流量与Shannon信息熵和固气比之间呈现较好的规律性; 不同流动形态的Shannon熵差异较大, 不同流型之间的Shannon熵区分度较好。Shannon信息熵分析为研究高压浓相气力输送流型及其转变特性提供了一种行之有效的办法。

关键词 [气力输送](#) [高压](#) [固气比](#) [Shannon信息熵](#)

分类号

Flow characteristics and Shannon entropy analysis of dense-phase pneumatic conveying of pulverized coal under high pressure

LIANG Cai, CHEN Xiaoping, PU Wenhao, LU Peng, FAN Chunlei, ZHAO Changsui

Abstract

Experiments of dense-phase pneumatic conveying of pulverized coal using nitrogen were carried out in an experimental test facility with the conveying pressure up to 4 MPa and the solid-gas ratio up to 450 kg-m⁻³. The influences of conveying differential pressure, gas volume flow rate and superficial velocity on the solid-gas ratio were investigated. The Shannon entropy analysis of pressure fluctuation time series was developed to reveal the flow characteristics. Through the investigation on the distribution of Shannon entropy in different conditions, the flow stability and evolutionary tendency of Shannon entropy in different regimes and regime transition processes were discovered. The relationship between Shannon entropy and flow regimes was also established. The results indicated that solid gas ratio and Shannon entropy increased with increasing conveying differential pressure. Shannon entropy was different for different flow regimes, and was able to identify the flow regimes. Shannon entropy analysis is a feasible approach to researching the characteristics of flow regimes and flow regime transitions in dense-phase pneumatic conveying under high pressure.

Key words [pneumatic conveying](#) [high pressure](#) [solid-gas ratio](#) [Shannon entropy](#)

DOI:

通讯作者 梁财 wylcl@163.com

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(471KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“气力输送” 的相关文章](#)
- ▶ [本文作者相关文章](#)

- [梁财](#)
- [陈晓平](#)
- [蒲文灏](#)
- [鹿鹏](#)
- [范春雷](#)
- [赵长遂](#)