

热能工程

整体煤气化联合循环系统气化岛特性模拟研究

王颖<sup>1</sup>, 邱朋华<sup>1</sup>, 吴少华<sup>1</sup>, 李振中<sup>2</sup>, 王阳<sup>2</sup>, 庞克亮<sup>2</sup>, 陈雷<sup>2</sup>, 陈晓利<sup>1</sup>

1. 哈尔滨工业大学燃烧工程研究所, 2. 国家电网燃烧工程技术研究中心

摘要:

气化岛是整体煤气化联合循环(integrated gasification combined cycle, IGCC)系统中较为复杂的关键单元, 对整个系统性能有较大的影响。利用Thermoflex软件建立200 MW级IGCC系统模型, 从系统角度出发, 对直接激冷式、除尘系统前带有气/气热交换器和取消气/气热交换器的3种IGCC系统进行比较, 结果表明取消气/气热交换器的IGCC系统同样具有较高的效率, 且系统更加安全可靠。对此系统中空分单元的氮气回注系数、气化炉单元的氧煤质量比, 以及对流废锅出口粗合成气温度进行计算。计算结果表明: 在空分系数为30%时, 系统最佳氮气回注系数为70%; 综合多种因素考虑, 所研究煤种的最佳的氧煤质量比约为0.91; 系统效率随着对流废锅(convective syngas cooler, CSC)合成气出口温度的增加而下降, 当辐射废锅(radiant syngas cooler, RSC)粗合成气出口温度为700 ℃, 对流废锅出口合成气温度取350 ℃, 系统效率较高。

关键词: 整体煤气化联合循环 气化岛 氮气回注系数 氧煤质量比 对流废锅

Simulation Study on the Gasification Island in Integrated Gasification Combined Cycle System

WANG Ying<sup>1</sup>, QIU Peng-hua<sup>1</sup>, WU Shao-hua<sup>1</sup>, LI Zhen-zhong<sup>2</sup>, WANG Yang<sup>2</sup>, PANG Ke-liang<sup>2</sup>, CHEN Lei<sup>2</sup>, CHEN Xiao-li<sup>1</sup>

1. Institute of Combustion Engineering of Harbin Institute of Technology

2. National Power Plant Combustion Center

Abstract:

The gasification island is a key and complicate unit in integrated gasification combined cycle (IGCC) system, and it affects the whole system performance greatly. The 200 MW IGCC system model was established using Thermoflex software, from the view of system, the IGCC systems with direct chilling, with and without gas/steam heat exchanger before dust removal were compared, the conclusions were obtained. That is, the IGCC system without gas/steam heat exchanger is much safer and has high system efficiency. Then the nitrogen re-injection coefficient in the air separation unit (ASU), the oxygen/coal ratio in gasification unit and the syngas temperature out of the convective syngas cooler (CSC) were studied based on this system. The result shows that: the best nitrogen re-injection coefficient is 70% with the air separation coefficient of 30%; with considering many elements, the best oxygen/coal ratio is about 0.91 based on the coal studied in this paper; the system efficiency decreases with the syngas temperature out of the CSC, when the syngas temperature out of radiant syngas cooler (RSC) is 700 ℃, the syngas temperature out of CSC is better to select 350 ℃ and then its system efficiency is comparatively high.

Keywords: integrated gasification combined cycle (IGCC) gasification island nitrogen re-injection coefficient oxygen/coal ratio convective syngas cooler(CSC)

收稿日期 2009-06-17 修回日期 2009-10-20 网络版发布日期 2010-01-27

DOI:

基金项目:

国家863高技术基金项目(2006AA05A110)。

通讯作者: 邱朋华

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(279KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 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
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 整体煤气化联合循环
- ▶ 气化岛
- ▶ 氮气回注系数
- ▶ 氧煤质量比
- ▶ 对流废锅

本文作者相关文章

- ▶ 王颖
- ▶ 邱朋华
- ▶ 吴少华
- ▶ 李振中
- ▶ 王阳
- ▶ 庞克亮
- ▶ 陈雷
- ▶ 陈晓利

PubMed

- ▶ Article by Yu,y
- ▶ Article by Qiu,P.H
- ▶ Article by Wu,S.H
- ▶ Article by Li,Z.Z
- ▶ Article by Yu,y
- ▶ Article by Pang,K.L
- ▶ Article by Chen,I
- ▶ Article by Chen,X.L

作者简介:

作者Email:

---

参考文献:

本刊中的类似文章

1. 陈晓利 吴少华 李振中 庞克亮 王阳 陈雷 何翔 王婧.整体煤气化联合循环系统变工况特性研究[J]. 中国电机工程学报, 2009,29(14): 6-11
  2. 陈晓利 吴少华 李振中 庞克亮 王阳 王颖.整体煤气化联合循环发电系统中气化参数对气化单元性能的影响[J]. 中国电机工程学报, 2009,29(23): 1-6
  3. 王颖 邱朋华 吴少华 李振中 王阳 庞克亮 陈雷 陈晓利.整体煤气化联合循环系统中废热锅炉特性研究[J]. 中国电机工程学报, 2010,30(5): 54-58
  4. 乌晓江 张忠孝 周托 陈玉爽 朴桂林 小林信介 森滋胜 板谷義紀.煤焦 - CO<sub>2</sub>/H<sub>2</sub>O气化反应过程中灰的熔融特性[J]. 中国电机工程学报, 2010,30(14): 36-43
  5. 邱朋华 王文杰 焦广亮 吴少华 秦裕琨.CO对碱金属凝结特性影响的试验研究[J]. 中国电机工程学报, 2010,30(11): 56-61
- 

Copyright by 中国电机工程学报